POPULAR AVIATION

Combined With

Aeronautics

A magazine for everyone interested in Gliders—Lightplanes—Models

Volume 7 DECEMBER, 1930 Number 5

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by CAPT. BOGART ROGERS*

The *STARTLING* TRUTH

Capt. Rogers completely destroys many of our pleasant beliefs about war flyers. There was no chivalry in war fighting,—no ethics. Either you got the other fellow or he got you.

EVERY time I hear someone speak of the war in the air—the late war and the French air—as a gallant and romantic business, a modern counterpart of the chivalrous strife of old, I break right out laughing.

Well, it wasn't.

It was a cold, calculating, deadly occupation—sans chivalry, sans sportsmanship and sans any ethics except that you got the other fellow or he got you. If you could shoot him in the back when he wasn't looking, or bring odds of ten to one against him, so much the better.

The archives disclose no inspiring examples of a dozen or fifteen courageous young fliers refusing to assault a single enemy because he hadn't a Chinaman's chance of escaping. That came under the heading of "cold meat," and cold meat was a favorite dish.

The great aces loved to increase their victories on fat old German planes that couldn't do much to stop them. You find the famous Major Bishop, for example, saying he was "praying for some easy victims to appear."

The only people who fully understand the war in the air are the fellows who fought it. You can't fool them. They know. The rest of the world may have sugar-coated impressions, but the lads who chased each other across the sky know what was inside the pill.

A lot has been written about the most famous heroes of the war—Guynemer, Ball, Bishop, Richthofen, Fonck, Rickenbacker, Luke and a host of others. Their chroniclers have penned their doughty deeds in detail. They tell what these fellows did in the air, but, doggone 'em, they say little about what they did on the ground—what they thought, how they felt or why they felt that way.

In a general way, it is intimated they were brave, high-principled young men fighting for king, country, France, democracy or something of the kind, which had little, if anything, to do with it.

THE psychology—for want of a better word—of war aviators was so complex and involved that it's hard to know where to begin to explain it.

War fliers were a class apart from the rest of the army. They thought, fought, lived and acted differently. In action and out, theirs was a hazardous game. They shook hands with death almost as soon as they started training, and encountered it regularly and frequently thereafter.

There were more ways for them to die than being killed by the enemy. They traveled at breakneck speed—aloft and below. They were young men, very young, for the most part, and inclined to be wild. Death was always just around the bend. They knew their worst enemy was the law of averages, which would overtake them in time. They knew if the war lasted they wouldn't. So they lived a dizzy pace. Life was to be short—they would make it sweet. "Eat, drink and be merry"—that was their motto.

It isn't strange they were looked on as a wild lot, undisciplined and insubordinate, some people said drunk and disorderly—a hard-fighting and hard-living corps of young devils.

They were, most of them, brave and daring and skilled in the art of killing, but they thought and did the most peculiar things for apparently the most incomprehensible reasons.

There was, for instance, the odd fact

SOME INCIDENTS IN THIS ASTOUNDING EXPOSE

Why Bob Graham refused to go to the hospital. How the pet of the squadron, "Gee Whiz," was shot down. What made John Trusler go off his nut. The spectacle of a drunken lieutenant with a six-shooter.

* War ace and post-war author.

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about WAR FLYERS

Decorations by Herman R. Bollin

"Eat, drink, and be merry" was the motto of the war flyers. For them life was short. This remarkable article contains some amazing revelations, and is studded with gems of exciting actual incidents.

that wounded pilots always tried to get back to their home fields, even though consciousness, or perhaps life itself, was slowly slipping from their grasp.

BOB GRAHAM was just a pilot in a British fighting squadron. He went out ground-straffing one morning during a furious German attack, a nasty job that carried him through a hell-hail of gunfire. When he returned to his squadron field, he taxied up to the hangars, swung his plane into line and switched off his motor.

"Hey, Pete," he called to one of his mechanics. "Come out here and give me a lift—and see if you can find the medical orderly. I seem to have lost part of a leg."

They lifted him from the cockpit, peeled off his flying togs and several pairs of woollen socks and found two very mean shrapnel wounds. The major arrived, took one look and told the medical orderly to rush young Mr. Graham to the nearest hospital for repairs.

"Only," said Graham, "I'll just stop and pack my baggage and take it along with me."

"Never mind your baggage," said the major. "I'll send it along this afternoon."

"Listen, major," Graham replied, "if I was wounded in seventeen places and about to die—which I'm not—I wouldn't move an inch away from here without my baggage. I hate to seem stubborn, but no baggage, no hospital."

I saw him two months later and kidded him about his baggage. I said it seemed funny under the circumstances.

"Funny, my eye!" he said. "Everything I own was in that baggage. I had a razor in there I've had since I started shaving. Somebody would have pinched it—they always do. If I'd been hit in the head by a six-inch shell I'd have come back for my baggage just the same."

The same morning "Binge" Tyrrell, a dashing Irish lad who had received a Military Cross only two days before,

was killed. He had been ground-straffing, too. Before his job was finished he fired a green light, signalling his companion he was going home. Half way to his destination he suddenly dived into the ground from a thousand feet. They found him later, a jagged shrapnel wound in his chest. He had died in the air.

IF THE statistics were ever compiled they would show that scores and hundreds of aviators lost their lives trying to get back home. Squadron commanders used to caution their boys to land immediately if they were badly hit, but somehow or other a lot of them wouldn't do that—and died when they might have lived.

Consider the circumstances and perhaps you can understand the reason. A "dog fight"—a swirling, diving, twisting chaos of planes, all shooting like mad. You're chasing a Hun, another one is chasing you. You feel a smashing blow in the shoulder, a sickening sensation and a peculiar one, perhaps not at all like you thought it would feel like to be hit by a bullet. Your plane tumbles into a dive, but you pull it out and streak for the lines, praying nobody will follow. There you are, thousands of feet in the air perhaps, alone, badly hurt—you don't know exactly how badly. It may be trivial or it may be fatal. You assure yourself it can't be anything serious—you'll go home and find out. You could land as soon as you crossed the lines—but you'd

rather go home. Of course you would. You're hurt and you don't want strangers messing around. You want to go back to the fellows you know and like and understand. And your plane—you might crash it landing in a strange field—much better to get back home. . . .

There was nothing new about that. Even a cur dog, when he's hurt, will try to crawl back to his hole under the porch. So a lot of boys died because, when things went wrong, they succumbed to an instinct as old as the ages—they wanted to go home.

THERE was no place in the air service for grand-standers. Except with the French, who characteristically made an unnecessary to-do over the most trivial achievements, heroics and theatricals were apt to get what is vulgarly known as the raspberry.

They were hard to put across. There was no audience at all—just the players in the game—and they were exciting and brutal critics. They could appreciate a good show well done, a brilliant bit of strategy or a daring flash of action, but they could see no reason for blowing steam calliopes about it. After all, it was all in the day's work.

It was no place for four-flushers or bouquet collectors, the flying corps. The boys knew a hero when they saw one. A lot of aviators received, for one reason and another, far more praise and glory than their deeds deserved—received it from the outside but not from the fellows they worked with and fought with and who knew to a split hair just how good they were and how much they had accomplished. Inversely, some of the greatest fighters in the service were almost unknown outside of it.

The lads who fought the war in the air resorted to many devices to make a nerve-racking business a little more easy to bear—embraced them unconsciously, for the most part, without recognizing them as the salvation they really were.

Four of these stand out:

A gradually acquired callousness and indifference to anything that might happen.

Strong drink, and lots of it.

A sense of humor, grim and distorted perhaps, that enabled them to push tragedy across the hair-line that separates it from comedy.

An ability to find solace in the doctrine of fatalism.

Callousness and a hard-boiled and unsympathetic attitude were the chief salvation of the air service.

Outwardly nobody was sympathetic. They had feelings, of course, but not very obvious ones. If your best friend was shot down you masked a breaking heart by declaring he was a damn fool who should have had better sense. You tried to make the rest of the boys believe he got just what was coming to a fellow who made a silly mistake—and they pretended to agree. It was his fault and it served him right!

The dear departed were seldom mentioned in public—at least not until enough time had passed to permit their being discussed impersonally.

What else could these boys do? They couldn't go all to pieces every time one of their pals "went west." Others would go the same way and they had to carry on. So they put the blame on the deceased and almost kidded themselves into believing they didn't care.

ONLY once did I see an entire squadron really go to pieces. It was a most unpleasant affair—like a baby's funeral.

Little Jerry Flynn was the pet of the squadron. "Gee Whiz," they called him—a Canadian kid who was just eighteen, but a captain, a flight commander and a veteran at this new kind of slaughter. The boys didn't like Jerry—they loved him—as you'd love a kid brother. When he would start away on a patrol with his head barely peeking over the edge of the cockpit he looked like a small child—he had little boy eyes and not the sign of a whisker.

One afternoon the whole outfit went on a short patrol over the lines, so short and so simple that everyone got careless. Three miles over, a dozen Fokkers appeared from nowhere. Jerry never saw them. Before the rest could come to the rescue he was tumbling down in flames.

"Poor little Jerry...They got him in flames!"

His particular pal was a chap named Green. They were like brothers—lived together and played together. When Green landed and crawled out of his plane the tears were streaming down his cheeks. He'd been crying all the way home.

"Poor little Jerry," he sobbed. "Oh, my God! They got him in flames! It was all my fault—I let him down—I didn't protect him!" He wailed out more and more worse things than that. If you've ever seen a football player whose mistake has cost his team an important game, you may have a faint conception of how this lad talked and acted. His heart was broken.

Everyone was on the verge of tears. It was too great a tragedy to conceal. It penetrated their calloused exteriors and jabbed at their hearts.

It was at dinner that the whole outfit blew up like a toy balloon. There were more cocktails than usual—it was the easiest way to forget. But for once they didn't work that way—they only made matters worse.

By the time the soup appeared everyone was three sheets to the wind but the teetotalers. There were guests for dinner and champagne was in order on guest nights. They guzzled it like water but it had no effect—the place was a morgue. Nobody talked—nobody dared talk. Jerry's seat was vacant—there wasn't a soul who would occupy it.

It happened suddenly.

A kid named John Trusler grabbed his champagne glass, hurled it the length of the mess, leaped to his feet and started a vivid impersonation of a lunatic passing his entrance exams for Mattewan. He swore and cursed and cried. He cursed God and the Germans. He cursed the war and the army. He cursed his parents because he was born. He told little Jerry Flynn—who he knew was in the room listening to him, who was sitting right there in that chair!—that he didn't have to worry. They couldn't kill him and get away with it.

He cursed far more capably and colorfully than a lad of his years had any right to do. They tried to stop him, and finally pulled him down in his chair. He hid his head in his hands and sobbed horribly. Half of the fellows were bawling. The rest were trying to quiet things down but feeling no better than the weepers.

Finally it subsided. The orderlies brought more wine and the original objective of finding solace in alcoholic oblivion was successfuly attained.

The next morning the hard-boiled masks were up again. They had to be, of course. They all told each other it was just another binge. They kidded Trusler for getting on a crying jag.

It was a tough break, they said, and the place wouldn't be the same without little "Gee Whiz"—but, after all, "C'est

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la guerre," and he had nobody but himself to blame. Why in hell didn't he watch his tail? Any guy who let himself be caught napping couldn't get sore if they shot him down!

Green had apparently regained his bravado with the rest. He went on an early morning patrol and evened things up for Jerry by knocking a Hun down in flames.

But later in the morning he collapsed —suddenly, unexpectedly and completely. His nerves snapped with the twang of a broken flying wire and they sent him home for a long rest.

STRONG drink and lots of it was a boon and salvation to the aviators. Show me a good, stout-hearted, cool, dependable air fighter, and I'll show you, nine times out of ten, a hard drinker. The fellows who drank could stand the gaff. It let them relax, it enabled them to forget and it made them sleep.

You usually found a set-up something like this:

A fighting squadron would include some twenty flying officers. About half of them would come under the heading of two-fisted drinkers. A few more would take a drink if sufficiently urged. Two or three might be teetotalers.

The boys whose records showed a lot of hours at the bar were the ones who chased the Hun hardest. Don't get the impression that fliers were habitual drunkards who flew and fought in an alcoholic daze. An overwhelming majority of them didn't. There were rare instances where boys would fortify themselves with a stiff little nip before starting on a patrol, and a few fellows used to carry a flask aloft with them, but they were the exception. It was simply that when the day's work was done the evening's drinking commenced.

Medical men say there is a physiological reason for this—that they can understand why the heavy drinkers might well be the best fighters with the steadiest nerves and the coolest heads. The fliers lived an abnormal life. Death and disaster were the daily diet. The exhaustion of nervous energy was tremendous. They had to relax and sleep and forget. They were in the front line every day, week in and week out. The end of a day's work found them in an abnormal physical and mental condition. They'd have to do the same thing tomorrow. They were tired and jumpy—so they drank—and their liquor made them normal.

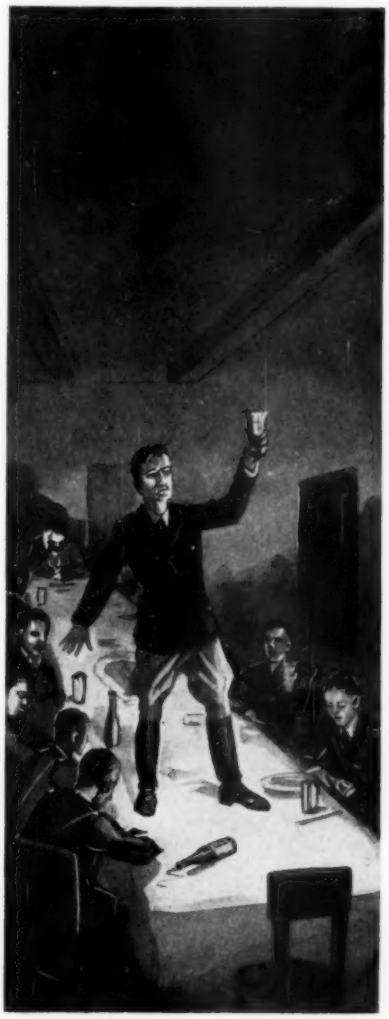
THE boys who chose to "shun the fatal curse of drink" were under the same nervous strain. They remained strictly sober and were therefore able to think straight. You did yourself no favor by keeping a clear head. The more strangely you could think, the happier you were likely to be. Instead of spending their leisure moments in convivial—you might even say bibulous —pursuits, the abstainers had plenty of time for cogitation. They could mentally figure their chances of coming through with a whole skin—which were awfully slim when you looked the facts in the face. So they worried and fretted and had no way to get the fears and horrors out of their systems.

They began to sleep badly. Some of them used to stand up in their beds and carry on furious battles with the enemy. They'd zoom and dive and rattle visionary machine guns and moan with horror when one of their comrades went tumbling to earth—which showed that these things realy did get under the cuticle.

One chap I knew used to play the whole cast of the show—he was both himself and his enemy and he handled the dual role like a Barrymore. The rest of the boys would rush in and watch these exhibitions with awe and wonder—but they seldom laughed. There was something about somnambulistic aerial combats that rapped your heart and not your funny-bone.

They got the "woofits" and lost their appetites and came to hate the whole messy business and sooner or later they cracked. Sometimes they cracked at the wrong moment—lost their nerve for a fatal instant when a Hun was chasing them up and down the sky—and the commanding officer wrote a consoling letter to their next of kin.

At dinner that night, the outfit blew up.



I KNOW of no war flier whose mental or physical efficiency was impaired by drinking. They could stand a lot of it. They were young, they lived comfortably, they could sleep as much as they liked. They were hounds for exercise and spent most of their time out of doors. You could put them to bed at midnight totally out of control and they'd climb out at six in the morning, or earlier, fresh as a morning glory.

The fact that a chap was a generous drinker in the air force didn't mean he would go through life with a bottle in his hand and die in an imaginary combat with a herd of pink elephants.

I know an indulging lieutenant who would, about once a week, get into an alcoholic tailspin, go to bed and lie on his back shooting holes in the roof of his hut with a six-shooter—"to get a little ventilation." He's a highly respected citizen now. The last time I saw him he politely refused a drink—he doesn't use it any more. But he did then—he certainly did.

And why not? They didn't figure futures, these fliers. There was no future. Life was today—they couldn't tell about tomorrow. They drank and gambled and loved, whenever the opportunity presented itself, and squandered their money and did a lot of things they never would have thought of doing before the war—and that they knew they would never do again if they survived. It was a phase, a life apart from life. It had no connection with the past, nor with the future.

Lack of imagination was another blessing.

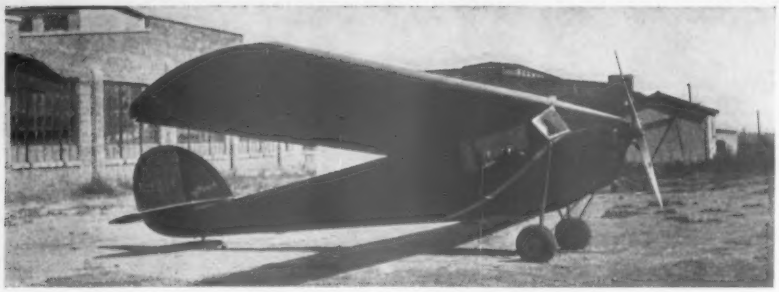
The less you had of it the more happy you could be. A lot of fellows who were supposed to have no nerves had nerves but no imagination—or kept it effectively strangled. There were so many things you could imagine might happen. You didn't dare think of them. You learned not to.

There was one almost universal weakness of imagination that helped everyone tremendously—they couldn't imagine themselves dead. Other fellows, chaps who were better fliers and fighters, more experienced, luckier perhaps, could go west by the dozen. The great aces were knocked over one by one. They could be caught unawares and shot to pieces in the air or tumble down in flames or destroy themselves in a crash, but you couldn't quite imagine these things happening to yourself.

It might have been vanity or ego, but it was surely an amazing paradox of thought. You knew your time would come. You knew the law of averages would catch up with you. You knew they'd kill you sooner or later—but deep in your heart you thought they wouldn't. Your brain was positive your days were numbered, but your imagination refused to prove it.

If you don't believe this, just try to picture your own demise. It's awfully

(*Continued on page* 53)



New One-Place Cessna on Market

CLYDE V. CESSNA, president of the Cessna Airplane Co., sent us a picture of his new one-place job.

This little plane has been flown over three months with a perfect score, making the trip to the national races from Wichita on 18 gallons of gasoline, bucking a 12-mile head wind all the way.

This 700-mile flight was made in one day by Eldon Cessna. From there he made various other places, then back to Sioux Falls, S. D., and back to Wichita; making in all a trip of over 1,700 miles.

This interesting lightplane weighs 450 pounds, lands at 25 m.p.h., cruises at 60 m.p.h. and has a top speed of 80 m.p.h. It is full cantilever tapered wing of usual Cessna construction. It is easily accessible by even a large person, as there are no struts or wires to interfere.

The new Cessna is priced at approximately $1,250.

Army Flyer Thrown From Plane in Dive

MORLEY F. SLAGHT, 2nd Lieut., Air Corps Reserve, was a member of a formation of planes from the First Pursuit Group, Selfridge Field, Mich., making a flight to Canada. Lieut. Morley states that he held his plane in a dive for approximately 500 feet, when it suddenly lurched to the left and downward with such violence as to hurl him from the cockpit. The safety belt evidently broke, as it was securely fastened before taking off on the flight.

At the time of leaving his plane, Lieut. Morley's only feeling was that of amazement at finding himself in the air. After falling several hundred feet he suddenly remembered he had a parachute, and after several grabs found and pulled the ring releasing the chute. On the way down the pilot's whole attention was given to slipping the chute to avoid landing in the city of Kitchener, Ontario, Canada.

Largest Wind Tunnel Creates 110-Mile Wind

THE largest commercially operated wind tunnel in the world has been completed at the plant of the Berliner-Joyce Aircraft Corporation. By means of the giant air tube, the engineers of the company will be able to determine the performance and stability of all planes they plan to build by measuring the forces and moments on exact scale models in the wind stream.

A large four-bladed propeller 12 feet 6 inches in diameter, powered by an electric motor which develops 224 h.p. at 850 r.p.m., will send the air roaring through the tunnel at a speed of 110 miles an hour.

The tunnel consists of two cones, the entrance cone being 16 feet square at the mouth. It is constructed of poplar, and narrows down to a circular throat 7½ feet in diameter.

German Lightplane on Tour

HERR MARTENS in his tiny plane in which he is making a tour of Europe. He is the German champion glider.

The lightplane is powered with a three cylinder motor and introduces a novel but practical design for an open two-place job.

Peculiar Design Carries Two Propellers

THIS strange-looking motor, according to its inventor E. E. Edwards, will actually chew up the severest storm and spit it out through the opening between the gas tubes. And there is a second propellor harnessed to the lighting and heating equipment which, he also claims, is driven from the breeze created by the front propeller and comes interestingly close to man's dream of "perpetual motion." The design is said to combine features of airplane and dirigible construction.

Glider Pilot in Flight Takes Extraordinary Self-photo

WHEN Ray Stafford and A. Lundgren started flying their glider out in California, they decided to make complete pictorial records of all their flights. They took several hundred views showing their glider in almost every conceivable attitude, in the air and on the ground, in take-offs and landings, close-ups and distant views.

But still dissatisfied, they decided to try for the ultimate—a closeup of the pilot in flight, taken by the pilot himself! They strapped a camera onto the left front wing strut and focused it on the pilot's seat. A cord attached to the shutter release completed the rig and Ray Stafford was towed into the air to test out the possibilities of self-photography in the air.

At about 600 feet altitude Ray went into a steep right bank and turn and pulled the shutter cord, with the result shown here. This remarkably interesting photo shows the San Francisco dune country over which he is flying and also gives a good idea of the manipulation of the controls during flight.

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How Navy Selects Squadron for Air Races

WOULD you like to know how the navy selected the flyers who participated in the air races?

It is the policy of the Navy Department to select each year, from the aircraft squadrons at sea, one squadron to participate in the National Air Races. The squadron selected is always a working unit, that is, one that fills a regular tactical position with the sea forces. No attempt is made to prepare a stunt or spectacularly flying squadron. In this way an honest effort is made to demonstrate to the public what a regular navy fighting plane squadron looks like.

This year the Fifth Fighting Squadron was withdrawn from the joint army-navy maneuvers off San Francisco and notified that it would attend the air races at Chicago only a short time before it was necessary to depart from the Fleet Air Base at San Diego, Calif.

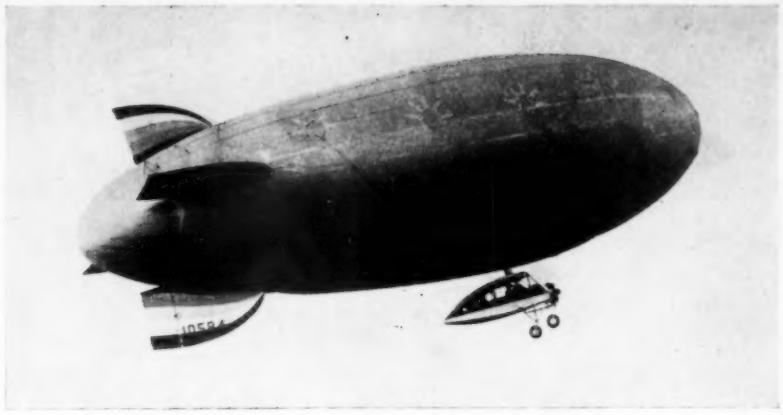
Landing Wheels Can Be Attached to Glider Skid in 5 Minutes

THE photo shows T. E. Mead sitting in one of his gliders equipped with landing gear, a new addition to the Rhon Ranger line of gliders and accessories.

Features of note in the new landing gear are its detachability, its lightness, and its shock-absorbing qualities. Four bolts are used to attach the landing gear to the glider, and it may be either installed or removed in less than five minutes.

The total weight of the complete installation, including tires, wheels, etc., is 14½ pounds. Shocks are absorbed by means of compression struts equipped with soft rubber cushion-rings, combined with low pressure two-ply glider tires.

It has been observed that this glider "luxury" facilitates the instruction of students, enabling them to master one thing at a time, and greatly increases the number of flights per hour. General wear and tear on the ship is of course very materially reduced.



New Baby Dirigible Can Carry 3 Passengers

WE ARE very fortunate in securing some excellent information about the Heinen air yacht from Lieut. Matzold, Capt. Heinen's assistant.

The air yacht is a baby dirigible that can be used for pleasure or business purposes. It will sell for less than $10,000, about one-eighth the price of any other small dirigible on the market. The Heinen ship was built and completed at the Navy Hangar, Cape May, N. J.

It is powered with a 100-h.p. Bronbeck Tige 6-cylinder engine and will carry four passengers, including pilot.

Captain Anton Heinen supervised the building of the Shenandoah. He was designer and builder of over eighty war-time Zeppelins, and was connected with the Zeppelin works in Germany for many years. His baby dirigible will require no ground crew, for one man can moor it, and can be controlled entirely by one man as easily as an automobile is driven.

In Germany the small dirigible is used largely as a traveling billboard, since the huge envelopes are ideal for sign purposes. The dirigible, not depending upon speed for buoyancy, can cruise at a sufficiently slow speed to permit people to read signs upon it.

The Heinen air yacht is a non-rigid dirigible. The hull (envelope) is about 104 feet long and about 27 feet in diameter.

The car (gondola) is of wooden structure and about 22 feet long and rests on a two-wheel landing gear.

The total weight of the air yacht "dry" is about 1,700 lbs. The useful payload is about 850 lbs., and the lifting capacity is approximately 2,700 lbs.

The hull is tailored out of 26 panels of two-ply-rubberized and alumnized long fibered cotton fabric. It consists of two compartments, the upper (large) *gas compartment*, with a capacity of 39,000 cubic feet, for lifting gas, and the lower (small) *air compartment*, which keeps the hull in shape and under pressure. Both compartments are regulated by automatic 18-inch valves.

On the "nose" of the hull are a reinforced nose cap and an anchoring cable. The elevators and rudders are, to the onlooker, very much like the stabilizers on other non-rigid airships, consisting of four wooden fins (8x12 ft.), covered with doped airplane cloth, and three rudders.

The cruising radius depends on the number of passengers. It will average 500 miles with one passenger; 250 miles with three passengers.

World Model Record Broken at Meet

PICTURE of Edward Miller, Chicago (left), and Elmer Lueckerath of Ferguson, Mo. (right), which were taken at the National Outdoor Model Meet during the 1930 Natl. Air Races.

Edward won first place with his compressed air motor model with a flight of 61 seconds, breaking the American record for compressed air model. This record is 9 seconds behind the world's record of G. A. Paverly of England.

Elmer won first place in the fuselage rise-off-ground event with a flight of 213 seconds, thus breaking the world's record formerly held by Joseph Ehrhardt, St. Louis, Mo., when he made his flight of 156 seconds last July and won the Wakefield trophy in England.

The Correct Way to Pack a 'Chute

A parachute should be opened and inspected once a month. If you repack it wrong, it won't make much difference to you, but it will to your family. Capt. Purcell offers a complete lesson, in his own humorous way.

by
CAPT. C. W. PURCELL

"HEY, Guy! When did you last roll that chute pack?"

"Aw—about six months ago."

"Six months! Say, punk, don't you know you're supposed to open that pack once a month and have it repacked? That's what you'd better do quick."

"Aw—that's a lot of horseradish."

No sirree, it's not horseradish. That's the dope and we don't mean maybe or but. Nine hundred and ninety-nine out of a possible thousand times a chute refuses to open, the cause is found to be due to staying packed too long.

Have you ever noticed perspiration around your body after a flight? This same perspiration seeps into your pack and makes it pack tighter and you can readily understand why a pack that has flown for six months without being opened has a good chance of never opening when you need it.

In the case of a silk bag this will cause rot quicker than in a cotton one.

Some chute builders have been in the habit of packing paper between the folds of the bag to try to keep perspiration out, but the best way is to break the pack down each month.

Now if you have one of these "six month" packs laying around, we'll show you how to open and re-pack it.

Take the pack out in back of some prop that's revving up, and pull the cord, letting the chute go when it finally opens. This will show you how quickly she would have opened—IF.

The next thing you do is inspect the bag for holes. Sometimes you will find a bunch of moths have built a "parlor, bedroom and bath" in the bag. If you find any of these pests, go over your bag with a glass and be sure you get all of them, and then fumigate the bag to kill the eggs.

These little precautions mean the difference between a nice "walk" home, or someone saying, "Doesn't he look natural?" One of the quickest ways in the world to have someone pat you in the face with a spade is to use a chute in an emergency that has several dozen moth holes in it.

IF YOU look around the hangar you will find a couple of good husky palookas who seem to have a lot of time on their hands. (The author has no idea where they come from, but every field in the country seems to have at least ten of these "time killers" on it.)

Put one of these palookas on each end of the chute and make them pull and shake like ——. Illustration number (1). This will stretch the bag and shrouds making them easier to handle.

Now lay some papers on the ground outside in the sunlight and let your bag lay there for a couple of hours, turning the bag to be sure that all parts of it get the sun. This seems to bring life to the bag as well as killing what moisture there may be.

Next, lay out paper on the hangar floor, and, after the bag has had its sun bath, bring the chute in and lay it down. Have the palookas pick it up and give it another good stretching. Test the vent in the crown to see that it's working, and when you are satisfied that it's OK start folding the gore as in illustration No. 2.

After the gores are folded, have the palookas lay the bag on the newspapers

The following steps should be taken in repacking a parachute. 1. Get a "palooka" to help you stretch and shake it. 2. Fold the gores carefully. 3. Lace in the shrouds carefully. 4. Fold the bag to fit the pack. 5. Pack in the pilot chute. 6. If pilot opened by spring wires, compress before packing. 7. Inspect rip cord thoroughly. 8. And the job is done.

XUM

and be careful (if the editor would allow it we'd say be DAMN careful) that the shrouds are not crossed when you have the chute laid out on the floor.

Seeing that your shrouds are not crossed is another way of being sure you're coming home to mamma when you bail out.

When you have the chute laid out, start "Lacing in" the shrouds into the case (Illustration No. 3).

Now don't get the idea into your head that you can "lace in" any old way. There used to be a lot of yahoos that thought that, but most of them were mailed to the cemetery in a blotter.

In lacing, be sure that you have no twists because each twist that you put in will delay the opening approximately fifty feet. Move the case up toward the bag as you lace, don't move the bag toward the case.

COL. HARRY ABBOT, the man in the illustrations, has made 3,000 jumps since the balloon days of 1910, and if you could see the attention he gives to his shrouds you could understand why he is still with us. He packs and builds his own chutes as his father did before him, and the old man is still alive.

When you have the shrouds laced in, start folding the bag to fit the pack (Ilustration No. 4). This is folded like an accordion bellows; women will recognize this as an accordion pleat.

Now we have our chute on top of the case, ready to be pinned in. The three sides of the case have holes in them to fit the two pins in the fourth side. Getting the pin holes to go over the pins may take a few cuss words but it can be done.

Take two pieces of strong string and thread them through the holes in the pins. Then put this string through the holes in the opposite side of the case and pull. When you have this accomplished put two small pieces of wire through the holes in the pins to hold them in the holes.

Now take a tire tool and run it down between the case and chute to be sure the sides of the case are laying flat.

In case there is a pilot chute to your outfit (Illustration No. 5), now is the time to put it in. At the crown of the bag you have a cord to tie to the shroud lines of your pilot, laying in your pilot shrouds just as carefuly as you did the others. Some pilots are opened by spring wires. If this is the case with yours, compress the pilot before putting it on top of the crown of the packed bag (Illustration No. 6).

Now bring the narrow sides of the pack over the pin holes in the same way that you did the broad sides, and don't forget to hold them in place with the wires.

Inspect your rip cord thoroughly (Illustration No. 7) before threading it through the metal tubing. This should be a good stout piece of cable and it must be firmly attached to the ring. Be sure of this.

(*Continued on page* 60)

Who Killed Capt. Immelmann?

A London reader sends us the official version.

[The following letter was received from Alan S. Hopper, London, England. —*Ed.*]

BEING a reader of practically every aviation journal on the English market, I decided to purchase an American Aircraft periodical and accordingly purchased POPULAR AVIATION, which certainly exceeded expectations and proved very interesting.

Among the articles which interested me most was that by Captain J. C. Bursey, R. A. F., entitled, "How We Shot Down Immelmann." This proved particularly interesting, as I have several books on the history of the R. F. C. and there appears to be some misunderstanding as to the shooting down of Capt. Immelmann.

The book I have at present in front of me is an authoritative publication and intended for private circulation only, and I thought the account of the final air duel of Captain Max Immelmann would interest your readers, as taken from this book:

"Three F. E.'s (Fighting Experimentals) were out over the lines on special patrol, two over Lens and the third between La Bassée and Souchéz. Three Fokkers were sighted by the two F. E.'s (our third being out of sight) and the two immediately signalled each other to attack. They flew to do so, but the Fokkers turned and bolted with the two F. E.'s in hot pursuit.

"The chase went some distance over Hunland and then the F. E. men, knowing that they must not leave the area of their patrol too far, turned back. The Fokkers followed them back, climbing as they did so to get the advantage of height, always an important factor in an air fight. The higher machine can dive at greater speed on an opponent, and also the diving pilot can come down 'out of the sun,' placing himself between the light and his enemy, so that the enemy, looking up to shoot as he descends, is blinded by the glare.

"Having gained their height and taken position, one of the Fokkers dived headlong, but out of range of the F. E.'s. This was an old and well known plan to decoy our pilots into diving after the lower hostile when one of those above would dive on the tail of our descending machine.

"The F. E. men refused to be drawn and started climbing towards the two higher Fokkers. The latter picked a F. E. each and dived on them. The Fokker that dived on McCubbin and Waller opened fire at long range and dived straight at the F. E. McCubbin swerved to avoid the attack and Waller opened fire at close range as the Fokker passed.

The F. E. followed down, but Waller saw that his shots had taken effect, as the Fokker went down out of control and crashed near Lens.

"McCubbin now turned his attention to the combat of the other F. E. and Fokker, and was just in time to see the F. E. shot down and nose-diving into the German lines—Lieut. Savage being killed and Robinson wounded in the head.

"McCubbin dived straight at the victorious Fokker about 2,000 ft. below. The Fokker opened fire at long range and climbing to regain height the two machines almost collided, McCubbin swerving, only just in time, the wings of the diving F. E. being riddled by bullets from the climbing Fokker. Waller opened fire at point-blank range, the Fokker swerved, the right wing folded back and the machine went down like a stone, crashing in the German lines near Anneg.

"McCubbin and Waller, on returning to their aerodrome, were told of a rumor that had come through from H. Q. that their second victim was Immelmann, the German Ace. This was afterwards proved to be correct, but it was only finally established from reports published later in Germany that Immelmann fell as a victim to McCubbin and Waller."

The following extract appeared in the official "*ROYAL FLYING CORPS COMMUNIQUE NO.* 40," *OF THE* 30*th OF JUNE*, 1916:

Extracts from the German newspapers relating to the death of Lieut. Immelmann make it clear that this pilot met his death at the hands of Second Lieut. McCubbin and Corporal Waller of No. 25 *Squadron, on the* 18*th inst.*

Extract from "Frankfurter Zeitung" of the 24*th June*, 1916:

OBITUARY NOTICE — On 18*th June*, 1916, *there met his death for his country in an aerial combat—*

MAX IMMELMANN

Knight of the Order Pour le Merite and Commander 2*nd Class of Royal Saxon Military Order; Knight and Commander of several high, and several of the highest Decorations; holder of the Iron Cross,* 1*st and* 2*nd Class; Royal Saxon* 1*st Lieutenant and Fighting Pilot of a Flying Unit. His glory and his name are his country's. In the annals of the German Flying Corps his memory will live as that of a bold flyer, fighter and conqueror. In the name of the Flying Troops of an Army.*

Stempel,
Royal Bavarian Major and Staff Officer of the Flying Troops of an Army.

AN INVITATION

All readers of POPULAR AVIATION *are invited to submit material to the editor. No requirements. Just write a little note on some design or accessory you have developed or an experience you have had.*

The odd shaped rear fuselage allows the gunner a clearer vision.

The wheels are built directly on the lower wing (below)

Note dual controls and ease of forced exit.

Some Intimate Details of a New French Military Plane

ONE of the newest and most interesting of the French military planes is the Breguet Type 270. This machine is one of a new series originated in 1929 by the famous pioneer designer, Louis Brequet and follows somewhat the same design as the former successful Breguet planes.

The construction of this plane is interesting, being of a type not ordinarily encountered in the United States. The plane is of all metal, riveted construction, no welding being employed at any point, and only those parts which are designed to be removable are secured with bolts. The metal wing and fuselage coverings carry no loads as the plane has a complete skeleton similar to that found in ordinary fabric covered planes.

The extensive use of die-cut and machine-riveted parts allows a high degree of interchangeability while the machine is readily dis-assembled for transport.

As may be seen in the accompanying photographs the Breguet 270 is a single motored, 2 place, sesquiplane.

The lower wing is built as one unit and contains the gas tanks. The landing gear is formed by two independent wheels each mounted directly on the main spar of the lower wing without any exterior struts or bracing. The wheel tread is over 11 ft. For the first time in military service, individual wheel brakes are used.

The cockpit nacelle is streamlined into the fuselage beam directly behind the gunner so that the angle of fire to the rear and below is greatly increased.

The observer's cockpit is also easily reached by a door on the left side. This cockpit is protected by a second windshield with adjustable side wings which serve as ventilators. The observer wears a back pack parachute and sits on a movable seat which gives him complete control of his guns. All essential controls and instruments are duplicated so that the observer may act as pilot in an emergency.

The doors of both cockpits are fitted with automatic releases which facilitate matters in case of a forced parachute jump.

In addition to the equipment mentioned, provision has also been made to carry both sending and receiving radio apparatus; aerial cameras; 1 fixed machine gun firing through the propeller blades; 2 movable machine guns; apparatus for machine gun photographs; aerial bombs; flare bombs and signal fusees; electrical heating equipment for both men and guns; and oxygen equipment.

With a 600 h.p. Hispano Suiza motor, this new Breguet Type 270, now being used by the French army, can develop a speed of nearly 150 m.p.h.

Power-Glider Built with Tubular Gas Tank

THE Wing "DRAGONFLY" is a high-wing externally braced monoplane. It is designed to meet the demand for a practical training plane, easy to handle for the novice pilot.

Of vital importance in a ship of this kind is a slow landing speed, which necessitates a large amount of wing area. To preserve sensitivity at slow gliding speeds, unusually large rudder elevator and aileron surfaces are required.

The fuselage is a perfect streamlined body. At its widest point it measures 28 inches, allowing the construction of a comfortable cockpit. There is room for a pilot and passenger, sitting one behind the other.

A special design feature is the way in which the empennage, engine and fuel tank are mounted. From the rear span forward a 7-inch chrome-molybd. steel tube carries the engine and is the natural fuel tank for 10 gallons of fuel.

The Sport of Killing Eagles by Airplane

GLIDING swiftly through the keen, freezing air more than a mile above a Marfa, Texas, sheep ranch, a gigantic Mexican eagle suddenly screamed in pain as his wing folded up under him and fluttered helplessly. Then it started circling crazily downward, fighting desperately with its one good wing to check the rapid descent.

"There goes 'Mr. Lamb Killer Number One'," remarked H. S. Bernhardt, crack pistol and rifle shot of the El Paso motorcycle force, to his companion as he slid another buckshot loaded shell into the smoking chamber of his shotgun. He then laid the weapon in the cockpit of the airplane in which he and Pilot Clarence Robey of El Paso had crept up behind the unsuspecting bird in its hitherto undisputed domain. Bernhardt then scanned the skies for the next likely victim of his unerring aim.

During the nine hours of thrilling sport, the hunters killed eight marauders of the air which for weeks had carried away and devoured an average of four lambs daily, the owner of the sheep ranch reported. One of the huge birds killed by Bernhardt measured more than nine feet from wing tip to wing tip.

Drop Guns into Position by Parachute

DEMONSTRATING the feasibility of transporting troops in airplanes and dropping them at strategic points, the Air Corps at Maxwell Field, Alabama, recently dropped a machine gun attached to a parachute, with a crew to man it following.

The gun was not damaged, and the crew landed within 50 yards of it. They soon had the weapon firing at an imaginary foe. Photo shows the machine gun just before it reached the ground.

XUM

Crazy Hops with Dumb Students

by

HAROLD S. CORBIN

Usually an instructor can bring the student around by calling him all the names he can think of. With others it requires something hard, like a wrench, to make a dent in the student's skull. Chief flight instructor C. E. Brayton has had fun working with his students, and also some mighty narrow escapes.

Burns Flyers Photo

"Quit it! Let go that stick, you blankety—," Brayton yelled.

"LET GO that stick, you blankety-blank-blank—!"

Like a whirling, dizzy, corkscrew the plane twisted down towards earth in a tail spin. Clyde Earl Brayton, flying instructor at the Parks Air College in East St. Louis, glanced over the side of the plane and turned again to the pupil in the rear seat. The boy sat frozen with fear, clinging to the controls.

"Quit it! Let go that stick, you blankety—" Brayton yelled.

"I wiggled around in the cockpit," he said afterward, "vainly trying to find something to throw at him. The ground was hardly a thousand feet down and we were dropping fast. Usually an instructor can bring the student around by calling him all the names he can think of. But not this bird. He was frozen and he wouldn't let go. I couldn't get the controls to guide the ship myself.

"Then suddenly—I don't know whether it was because of what I called him, or that he just woke up—when it seemed certain we'd crash, he snapped out of it. His stupor passed. It was just in time. I brought the ship out of the spin and we landed safely. But gosh, it was close!

"Oh, sure," Brayton laughed; "after a while he became a mighty good pilot."

The best raw material for flyers comes from athletes and motorcycle riders, farm boys and automobile mechanics. But, at variance with the statements of some other instructors, Brayton insists that women simply can't learn. That is partly because they dislike to be told, he believes, and partly because they do not have the gift or knowledge of mechanics that he says comes so naturally to men.

But there's a thrill every day, every hour—every minute even—in teaching candidates to fly. The instructor never knows what each day will bring forth, at the hands of the students.

Brayton is six feet tall and weighs 200 pounds. He saw service with the Marines in Haiti, back in 1920.

"The longer the students are taught," Brayton explains, "the cooler they become. It's all a matter of getting used to the thing. At first teaching students to fly is nerve-racking enough because of the crazy things they do. But the instructor quickly learns to analyze his student. Nowadays the structural defects of airplanes, common in the old days, don't cause so much trouble. It's the personal peculiarities of the individual that must be overcome."

For example, the boy from Colorado who nearly did for Brayton in the tail spin, appeared to be as cool and collected as anyone could wish, when they started out. He had been learning rapidly and the time came when Brayton believed he could safely teach him how to come out of a spin.

Brayton sat in the front cockpit, as is customary while instructing in dual-control ships, and the two of them climbed the Standard training plane to 3,000 feet. There Brayton signaled for the boy to take the controls, turn it into a spin and then come out of it.

It was an easy matter for the student to put it into the spin. But after three revolutions, with the ship going faster and faster, Brayton began to get uneasy, waiting for the boy to bring it out. When he looked around, the boy was paralyzed with fear.

It may have been the harsh things Brayton called him, or it may have been that the boy, fighting against the numbness of fright, at last overcame it. However, it was, it certainly was fortunate for both of them that he *did* snap out of it.

BUT there was another fellow with mulish tendencies that Brayton for a time gave up hope of ever teaching. He was so contrary he would do anything but what his instructor directed. Here Brayton was in real danger. Coming in to make a landing one day the fellow headed in a direct line for another plane at 1,500 feet altitude.

"Where you going?" Brayton yelled at him. "See what's ahead of you. Pull it up!"

The boy paid no attention.

"Pull it up!" Brayton yelled again.

But the pupil piloted the ship serenely onward directly toward the other plane.

Brayton waved his arms, pointing to the ship ahead. The boy did not move. He did not seem to comprehend. He kept on. In desperation Brayton grabbed the stick, took control himself and brought the ship down. When they

Some of Brayton's students receiving their tri-motor ground instruction.

landed, Brayton asked him if he were blind.

"Course not. I saw the ship," the boy snapped. "I heard what you said. But we were on a different level. If we happened to get on the same level, couldn't we dodge the other one?"

"Maybe an experienced pilot could," Brayton agreed patiently. "But, son, you must do what I tell you in the air."

The boy said nothing, but his attitude was sulky. That same day they took off again and the student had the shutters of his plane closed. The motor boiled over and they had to land. Brayton told him to land down the wind. But the boy landed up the wind.

They took off again and once more the boy headed straight for some other planes and once more Brayton had to take the controls.

The next day when they were flying at a low altitude Brayton told him to open the shutters. Instead the boy pulled the choke and killed the motor. Saying things to himself he learned when he was a Marine, Brayton once more grabbed the controls and they landed in a corn field without damage.

"You'd think I'd have given him up right then and there," Brayton said afterward. "You'd think I'd have let him kill himself and once and for all stop that obstinacy. But I didn't. I went ahead with him because it was a game with me and I wanted to see if I could win him. He still insisted he wanted to fly. Well, believe it or not, he eventually turned out to be one of my best."

WOMEN in the air are a bugaboo to this instructor. He shakes his head when you talk about them to him. He has attempted to teach only three, and none of them finished successfully.

Clyde E. Brayton, chief flying instructor at Parks Air College, has had several weird experiences with students.

A merry trio in training at the Great Northern Aviation School. Nevertheless, to flight instructor Brayton, Women in the air are his bugaboo.

He lays it chiefly to their apparent lack of a mechanical sense.

"One of my women students, thirty years old," he asserted, "didn't know the action of the top or bottom rudder, which is like a motorist not knowing how to steer right or left, and yet she wanted to sideslip—something only an advanced flyer should attempt.

"'Don't try it yet, please!' I told her.

"'Why not?' she countered. 'I can do it.'

"Again I told her not to. Did she obey? She did not. She got highly indignant because I wouldn't let her try it.

"Another woman student was well past sixty-five and crippled in one leg. I had my doubts about her when we went up, and an hour's instruction proved my mental prophecy correct. I told her she never could become a pilot. She got awfully angry at me, and just couldn't understand.

"One boy I taught had a peculiar idea that violated all aviation rules. I took him up in a training ship and was instructing him on landing. As we approached a landing, the motor suddenly stopped. When we got down, I spoke to him.

"'What's the big idea of cutting out the switch, son?' I asked.

"'I didn't cut any switch,' he replied.

"I studied him. I knew blamed well he cut that switch, but I couldn't figure out what was in his mind, or why he lied about it. I wanted to find out, so I tried him once more and we went up again.

"As we approached the ground for a second landing, I warned him to let the switch alone. He nodded, appearing to understand.

"Then suddenly, as we were about 500 feet in the air, the motor quit, backfired and burst into flames.

"Instantly I shut off the gas under the cowl, and the gasoline in the carburetor burned itself out without damaging the ship. When we got down, I turned to him.

"'Tell me,' I pleaded, 'why in heaven's name you shut off that switch.'

"'But I didn't shut it off,' he insisted.

"Again I knew he was lying. I could have bawled him out and had him thrown off the field and turned out of school. But there's a strange quirk inside me somewhere that makes me want to find out things about fellows like that. They're interesting to study. This chap intrigued me. What was buzzing inside that brain of his, and why was he acting up that way? I wanted to find out, before I resorted to any extreme of firing him.

"We went up once more. He pulled the ship up into a dangerously steep climb. When we had altitude enough I gave him the signal to nose down.

"Once more the motor stopped!

"Well, sir, what I said right out loud doesn't matter here. I took the controls and landed the plane. Then I went after him.

"I razzed him up and down, forward and back, sideways and hitherward. I made up my mind I'd make a dent in his skull if I had to use something hard. He stuck up to me a few minutes, his jaw set, his face white, saying hardly a word, but taking my razzing. I was about to tell him to pack up and get out when he capitulated.

"Breaking down at last, almost crying, he admitted he had turned off the switch each time.

"'I—I thought if—if you cut out the engine,' he said, 'it would let the plane nose down without having to—to use the stick or controls.'

"I gasped at that.

"'Listen, son,' I said, trying to keep my patience; 'you're paying good money to learn to fly, aren't you?'

"'Yes, sir,' he admitted.

"'And when you're up off the ground where there's nothing to cling to but your instructor's advice, isn't it a good plan to pin your faith to what he tells you?'

"'Y-yes, sir.'

"'Well, then—what's the answer?'

"We got along tip-top after that. He had a queer notion in his head, you see, and doggedly clung to it until I showed him the light. Eventually he learned to fly and we became good friends."

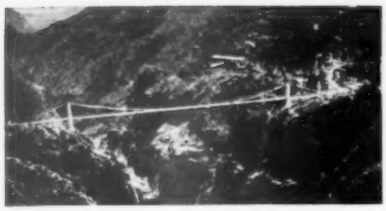
BUT they don't all make good. While the percentage is small, there are a few destined to be failures who, in spite of everything that can be done for them, somehow don't come through. They haven't the knack of handling a plane, Brayton says, and they never can acquire it.

Apparently there is an inborn fear in some of them that simply cannot be overcome. Others have strange quirks that develop into bad mind habits, just as others acquire bad physical habits. On the field they are termed "wash-outs," and wash-outs they remain when sadly they pack up and leave.

One of Brayton's students who proved to be a wash-out had a habit of almost landing on other planes in mid-air. The presence of another plane nearby was to him like a magnet drawing a piece of iron. No matter what course he was set to follow, to glimpse

(*Continued on page* 52)

XUM



A careful observer can detect the plane as it flies over the bridge.

Young Pilot Performs Daring Feat

D. F. BURNES, an intrepid youngster of Denver, Colo., early this year performed an extraordinary feat. Pilot Burnes flew under the bridge which spans the Arkansas River near Canon City, Colo. This bridge, at an altitude of 7,000 feet, is the highest bridge in the world. The feat has been attempted by no other person.

Mr. Burnes said the main difficulty in performing this stunt was to select a day when there was little wind—and that day was hard to find at that location.

Phil Reid, another pilot, was flying near enough to make an excellent photograph both of Burnes' plane flying *over* the bridge and of the bridge from an altitude of 800 feet above the bridge—or 7,800 feet above sea level. The duration of the flight under the bridge was so brief that a photograph could not be taken.

Ford Pilot Carries 10 Passengers on Blind Flight

DEMONSTRATING that it is possible to fly a regular passenger transport plane from one terminal airport to another entirely by means of instruments and radio beacons, Pilot W. E. Larned of the Stout Air Lines flew "blind" from Chicago to Detroit recently. Ten passengers were aboard the Stout transport on the flight.

Taking off from Chicago Municipal Airport on the late afternoon flight to Detroit, Pilot Larned circled the port until he had gained an altitude of 2,000 feet. Then he "blinded" the control cabin of the Ford tri-motor plane with cardboards, leaving a space for an observer to watch out for other planes along the airways, and started his 250-mile flight to Detroit.

Keeping his plane in level flight by means of his instruments, Pilot Larned used the government radio beacons until he reached the vicinity of La-Porte, Ind. Then he swung off, the beacons steering a compass course to the northeast until he approached Jackson, Mich., where he picked up the directional radio beacon from Ford Airport, the Detroit terminal of the Stout lines.

With the control cabin still "blinded," Larned brought his plane over the Ford Airport without once having seen the ground after taking off from Chicago. The cardboards then were removed from the cockpit windows and he landed the plane on schedule, two hours and a half after the Chicago departure.

An Advance Report on a Brand New Lightplane

POPULAR AVIATION readers are again privileged with being the first to hear about another new development in the lightplane field.

This strikingly different plane (as seen in the accompanying photographs) has been built by the Nu Day Plane Co. The designers and builders of this unusual ship are Geo. Townsley and L. G. Willing, both having had years of flying experience.

The Nu Day Plane is a midwing monoplane with semi-cantilever externally braced wings. The designers have used their own designed airfoil, their own designed fuselage, and also have installed a landing gear of their own invention.

Without question, the most outstandingly different part of the ship is its fuselage and tail surfaces. The fuselage is designed in somewhat of a diamond shape with the upper sides of the diamond much shorter than the lower sides. The fuselage thus comes to a distinct sharp edge on the top and to an even sharper edge on the bottom. With absolutely no additional curves or artificial streamlining, this fuselage is just a natural perfect streamline.

This diamond-shaped fuselage thus forces an unusual blast of air on the tail surfaces which makes the tail surfaces much more effective than in the ordinary plane. In fact, the effectiveness of having this exceptionally large blast of air on the tail surface is so great that the size of the tail surfaces has been materially reduced.

Off hand, a person looking at this plane might think that the tail surfaces were much too small, and they are small, but it is the sharp shape of the fuselage that allows these controls to be so small. In fact, any larger tail would only place a needless strain and weight on both the tail itself and the fuselage.

The fuselage and tail construction is all of welded steel tubing. The shape of the fuselage thus reduces considerable tubing over the conventional type ship, which naturally means a greater reduction in weight and price of the ship. The weight of the fuselage is only 45 lbs.

Each rib in the wing weighs but 4 oz. Steel compression struts are used in the wing. The ailerons, just as the tail surfaces, appear small, but this again demonstrates how the shape of the fuselage on this plane determines to such an extent the size of the control surface. The tail surfaces are so affected by this that the ailerons are hardly needed—that is, manual operation of the aileron control is not needed, for the plane will bank and come out of the bank and continue to fly straight and level without using any aileron control.

The landing gear is of the split type, but at the same time each axle is straight, neither axle being curved or heat treated. This naturally increases the strength of the landing gear considerably. Instead of the expensive oil shock absorbers, merely a shock ring with ordinary shock absorbing cord is used. The entire landing gear, less wheels, weighs only 18 lbs.

The Nu Day ship is powered with a two-cylinder opposed air-cooled Lawrence motor. Its top R. P. M. is only 1,300; however, the propeller has a very high pitch, which thus enables it to operate just as efficiently as if it could "rev" up more on the take off.

The performance of this ship is excellent. Incidentally, it was designed to have a 60-h.p. motor, but at the last

(*Continued on page* 54)

Three views of the Nu-Day plane. The small tail surfaces and novel streamlining allow for unusual performance.

A recent portrait of the author.

How to Build the HEATH

This is the first complete and official set of instructions that Mr. Heath has ever offered. The Heath Parasol for many years has distinguished itself in the lightplane field. Our readers now have the opportunity to build this plane from competent directions.

E. B. HEATH is offering to the public through POPULAR AVIATION, a complete set of instructions, together with blue prints and a list of all materials and tools necessary for the construction of his Heath Parasol Plane.

Readers of POPULAR AVIATION are indeed fortunate to be the first to get this information.

The construction details, to be started in this issue and to be run until completed, are the first complete and official set of instructions that Mr. Heath has ever offered. Other publications have had "stories" on how to build the Heath plane, but none of them have ever had Mr. Heath's own detailed and perfected set of instructions.

The Heath Parasol Plane is a monoplane, with the wing above the fuselage (of the parasol type) as can be seen in the accompanying photographs. It is a one place open cockpit plane, and is powered with a 30 H.P. Heath B-4 motor (for those building their own ship, any motor of similar H.P. and size can be installed.)

The photograph shows its split type landing gear, windows in the wing, door on the left side and its clean cut tail assembly (with no wires on which weeds and grass will catch).

To get an idea of its general size and performance, some of the specifications are as follows:

Wing spread, 25 feet.
Length overall, 17 feet.
Height, 6 feet.
Top speed, 85 m.p.h.
Landing speed, 28 m.p.h.
Cruising range, 6 hours.

Mr. Heath is one of the oldest airplane manufacturers in the aviation industry, and is the oldest in the light plane field. He started manufacturing planes in 1908.

ONE of the most important and necessary points in the construction of any light plane is its cost. The Heath plane can be built for $199.00 (less motor). To those who have a motorcycle or any small motor of about the same size and horse power as the Heath B-4 motor, this can be used. It is possible to buy a re-manufactured Heath Henderson motor complete with propeller for only $250.00. A new motor would cost around $300.00 (less the propeller).

Thus it can be seen that its cost of construction is quite low. Likewise, its operation cost is low—only 1c per mile.

The cost of storing the Heath is also quite low, since its wings can easily be detached and placed alongide the fuselage and in this way it takes up no more room than a small car. In fact, the plane can be hooked on to an automobile and towed home to your own shed or garage with ease.

Next to the cost of the plane should be considered the time it would take to build it. During the past summer one young fellow built his Heath plane completely in only three weeks.

For the ordinary person, spending just part time, there is no question that he could easily build the plane and keep up with the construction details as they will appear each month in POPULAR AVIATION. It will take approximately five to six months to complete the series.

Mr. Heath has assured POPULAR AVIATION that if anyone who starts to build a Heath plane from these plans runs into any difficulties he will be only too glad to answer any letters or help solve any problems.

Mr. Heath has the standing offer that if anyone will bring his own built Parasol to Mr. Heath's airport in Chicago, that he (Mr. Heath) will give it a thorough inspection and will even test hop it free of charge!

We have known of several cases where Mr. Heath has made trips of at least 100 miles from Chicago, free of charge, just to help someone who has run into difficulties, or to test hop someone's plane.

If any readers get stuck on any point, while building this plane, write to us, and we will turn the letter over to Mr. Heath.

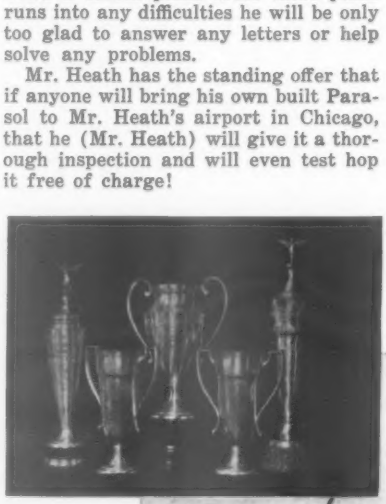
The Heath Parasol plane is one of the most versatile planes built. It is possible to make the Heath plane either a land plane, a seaplane, or to equip it with skiis for use on snow.

Besides making the plane with any of these three landing gears, it is also possible to make it either a mid wing, a low wing, or the standard high wing, parasol type. The regular standard fuselage is so designed that the wing can be placed in any of the three positions.

IN THE construction details to be run in POPULAR AVIATION we will tell only about the parasol type, since, according to Mr. Heath, this is by far the most practical.

"The visibility is much better, the performance is better and the plane is generally much more practical with the parasol type than either of the other two ways," says Mr. Heath. "With either the midwing or low wing, the visibility is greatly hindered when it comes to landing, for you can't see through the wing, and this point, to those who have not had many hours of flying, seems to me to make the parasol much better."

Mr. Heath has also recently designed



Left—Some of the first prizes won by Mr. Heath with his popular little ship. The fine performance and the reputation of the Heath Parasol makes it an ideal one for the amateur to build.

Right—A view of the Heath Parasol showing the simplicity of its design. Note the split axle; also the ease with which the pilot can enter his cockpit.

XUM

Specially written for Popular Aviation

by E. B. Heath.

PARASOL

Build this famous lightplane yourself. Get your friends to assist you. Mr. Heath will answer all questions while you are building the "Parasol" and will test-hop it free of charge when you have finished. Don't miss this great opportunity!

a larger wing to fit on the fuselage. This new wing spread is 31 feet, or 6 feet more than the standard type wing.

This big wing is suited particularly for higher altitude flying, and therefore possibly would be more practical in some of the western states. The large wing would also be more suitable if a useful load of 350 lbs. is desired.

The fuselage of the Heath Parasol plane will be built entirely of steel tubing. At the present time, according to Mr. Heath, about 60 per cent of the people building his planes themselves are not equipped to do welding. The other 40 per cent are equipped to weld, and for that reason Mr. Heath has complete plans, both on how to build a bolted and riveted fuselage and also how to build the welded fuselage.

As a result, POPULAR AVIATION will run both plans for the convenience of everyone. Incidentally the bolted and riveted type construction is one that is entirely different from that of any other manufacturer. It differs from the old Heath plans and any others, in that now there is a minimum of the old wire turnbuckle bracing used.

In conclusion, before reading Mr. Heath's own instructions, let us say that we know almost every reader *can* build this plane if he wants to. There have been a great many others build this same plane in every state in the union, before they had nearly such complete instructions.

With these splendid construction plans, with every detail mentioned, even as to how to hold the tools in your hands, you should have splendid success.

Let's get started, and next spring keep Mr. Heath busy test-hopping all the airplanes built from these plans.

Below—An interesting view of the Heath Parasol. Note the windows in the wing which allow the pilot full vision in all directions.

BUILDING THE HEATH PARASOL

By E. B. Heath

Group 1.—The Ribs

14 regular ribs—10 aileron ribs—2 end ribs.

Tools

1 carpenter hammer—1 tack hammer —1 scissors—1 knife—sand paper.

Materials

V-3, 500 ft. spruce, 7/32"x7/32" (rib strips and filler cap strips)
V-4, 10 sq. ft. 1/32" plywood (rib gusset plates)
V-10, 40 ft. spruce, ⅝"x7/32" (reinforcing strip)
V-12, 38 ft. spruce, ½"x⅝" (compression struts)
V-57, ½ lb. ⅝"x21 ga. flat head wire nails (for rib gussets)
V-68, ¼ lb. ¾"x20 ga. wire nails (compression struts)
V-126, 1 lb. casein glue

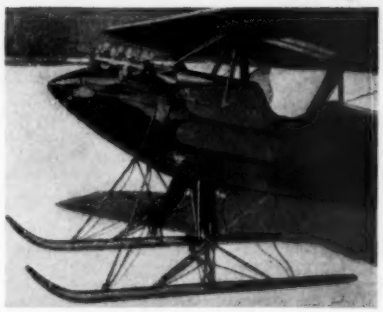
Procedure

THE first thing to do is to reproduce in full size the scale drawing of the Clark "Y" rib section shown here. The measurements given can be easily laid out on a piece of ordinary wrapping paper.

Then, build a jig by pasting the full size drawing on a flat board large enough to accommodate it and drive eight penny nails from which the heads have been clipped into the board at points along the outline of the rib and its struts. When a piece of the cap strip is placed on the drawing the nails will hold it in its proper position. Allow the nails to extend about three-quarters of an inch above the board surface.

Next, boil some water in a pail and stand about ten of the 7/32 inch strips (V-3) in the water to a depth of about twelve inches. Do not try to make too many ribs at one time. Cut enough of the other 7/32 inch cap strips to make the small struts between the top and bottom rib surfaces as shown on the drawing.

Cut with a pair of scissors a number of small gusset plates from the plywood sheet (V-4) to brace the struts where they join the rib surfaces. Mix about one-fifth of a pound of glue.



Above—The Heath Parasol can be adapted to land, water, or ice. Here we see the little ship equipped with skis. Wouldn't you like to build one of these for yourself?

When you have done these things, the cap strips which you have left in the boiling water will be pliable enough to start making into ribs. Remove two strips and place in the jig with the softened ends at the nose of the rib where the greatest bend is made.

Place the internal bracing struts in position and after spreading one surfact of a plywood gusset with glue, nail it to a strut where it joins the outer strip. Nail a gusset at each joint and at the nose and rear of the rib. When all joints have been so secured remove the rib from the jig and turn it over on your bench and then glue and nail gussets on that side so that all joints are fastened at both sides.

The nails are long enough to extend ¼ inch, allowing them to be clinched, giving added strength. When clinching nails place a flat piece of iron beneath the nail head. Put this rib aside to dry, and build another. Make fourteen regular ribs. Two of these you will later make into compression ribs.

Aileron Ribs

WHEN building the ribs which are to be placed at the outer half of each wing where the aileron will be, you will note that there are ten to be built, four of which you will later make into compression ribs (see Compression Ribs).

Aileron ribs are built in the same jig as the regular rib but the small vertical strut which forms the rear boundary of the rear spar opening is omitted and the diagonal strut following the rear spar is moved farther back as is shown on the rib drawing.

End Ribs

A special jig must be built for the small end ribs. The end rib is shown in scale with correct measurements and may be drawn full size on a piece of ordinary wrapping paper. Make two end ribs.

Butt Ribs

BUTT ribs are regular ribs which are strengthened by nailing and gluing a 7/32 x ⅝ cap strip (V-10) edgewise to the rib. Two of these strips must be softened at the end by soaking in boiling water and bent in the jig as before.

When dry, a regular rib is laid on top and glued and nailed to these two 7/32 x ⅝ strips. A vertical strut of 7/32 x ⅝ wood is placed at the nose of the rib to which will be screwed the leading edge when the wing is assembled. There are two butt ribs, one for each wing, and are strengthened on opposite sides.

Compression Ribs

Compression ribs are ribs which are

strengthened by gluing and nailing two 2 foot 5⅛ inch lengths of ⅛"x⅝" spruce (V-12) which have been tapered to 5/16 x ⅝ at the ends, along the middle line of the internal rib struts, one on each side of the rib, from the rear strut of the front spar opening to the front strut of the rear opening.

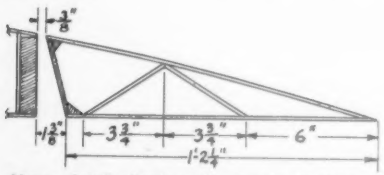
These ribs are placed where the wire terminals are fastened to the spars when the wings are assembled. There are three in each wing panel. Six in all. Of the six, two are made from regular ribs and four are made from aileron ribs.

Finishing

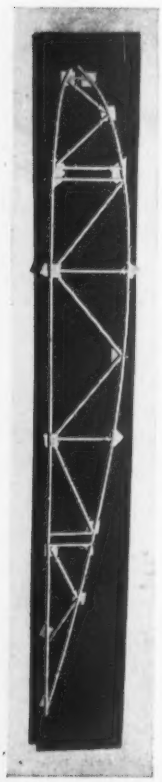
When the ribs have all been built, they should be trimmed. All parts of the gussets extending beyond the cap strips should be cut off and the ribs rubbed smooth with sand paper. The edges which will come in contact with the covering cloth should be slightly rounded.

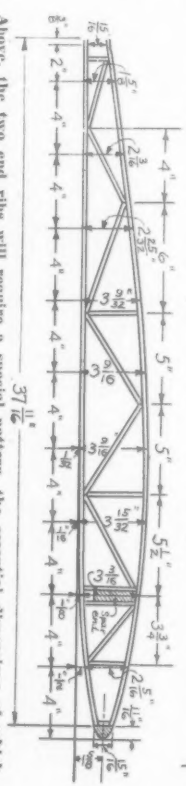
The nose of the rib to which the leading edge will be fastened should be cut off at the proper distance and angle as is shown on the drawing. The ribs should then be hung in a safe place while you proceed with the next step in building your Heath Parasol.

Next month this series will be continued with instructions for building the wing.

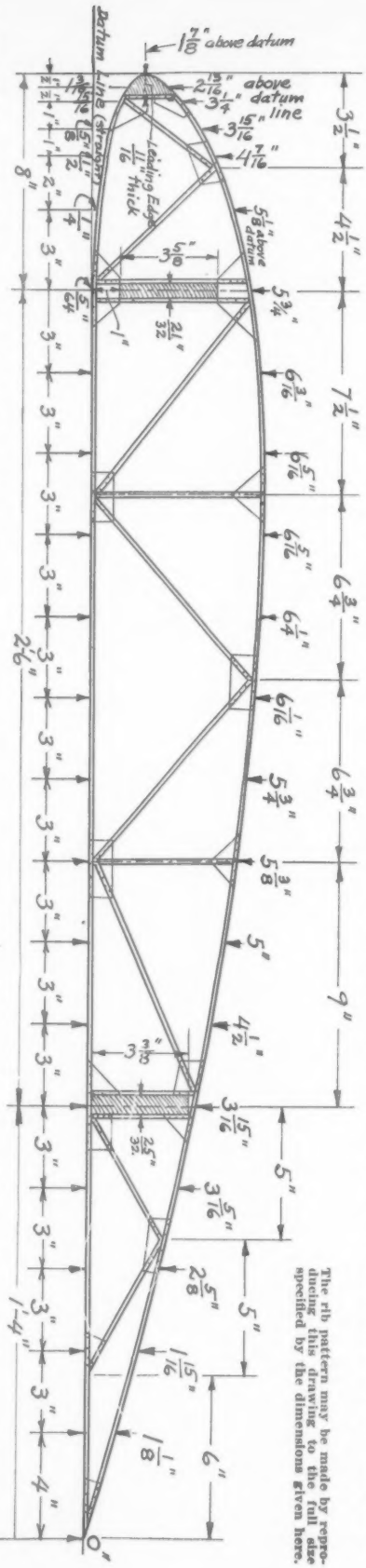


Above, detail showing the structural changes necessary to convert the regular rib into an aileron rib.





Above, the two end ribs will require a special pattern, the essential dimensions of which are given here. Below, the rib in process of construction showing how the parts are held in place in the jig by the guide nails.



The rib pattern may be made by reproducing this drawing to the full size specified by the dimensions given here.

Tales of the Caterpillar Club

Lt. Soucek jumps after a collision in mid-air.

APOLLO SOUCEK, Lieut., U. S. Navy, holder of the world's altitude record, gave the following account of the emergency parachute jump made by him recently:

"During aerial maneuvers near Camp Kearney, Calif., I accidentally struck a scouting plane with my left wings, both upper and lower. The collision completely severed the lower wing and damaged the upper to a great extent. The plane was moving at high speed and at an altitude of about 1,500 feet. After the impact I saw broken parts carry away. The plane went into a violent diving spin, making my exit most difficult. Centrifugal force seemed to hold me fast in the cockpit.

"In some unaccountable manner I had pulled the parachute rip cord when I released the safety belt. I realized this action increased the danger as the chute was almost certain to get caught in the tail, but it was too late to correct the mistake, and I could only hope for a good break. But the good break was not forthcoming, for when I finally pushed myself from the cockpit the parachute opened immediately, caught on the tail and hurled me around in the air like a pendulum.

"I thought my time had come, as I recalled the inevitable result to others in similar circumstances and I knew that the ground was very close. Although I was falling fast, hopes went skyward when the chute tore loose from the tail and threw me off like a stone from a slingshot.

"I felt a welcome sudden check in speed when the chute opened, but was dismayed when I looked overhead and saw a great hole torn in the silk and the chute threatening to collapse. Sagebrush on the ground was coming up fast. I heard the smash of the plane hitting the ground and the next instant hit the ground myself in a clear soft spot among the sagebrush.

"I was not unconscious, but had a terrible pain in my back. Could scarcely stand when I unfastened the parachute harness. The torn chute let me down about as fast as a jump from a 50-foot building without chute. I believe I didn't fall more than 150 feet after I was thrown clear.

"Ensign Wayne T. Stukey, who saw the accident, followed me down in his plane. He says I bounced 10 feet when I hit the ground. Landed about 20 feet from the wrecked plane. Stukey found me with the aid of two local men and drove me in a borrowed car to Camp Kearney, from where we flew to the San Diego Naval Air Station in a Navy two-seater.

"Scouting plane with which I collided had end of wings cut off, but flew back to station. I am in the Naval hospital now with a sprained back, but no broken bones nor serious injury, and expect to be flying again soon."

XUM

Pilot Balloons Travel High

ON SOME of the ships that ply in the Baltic Sea, so-called pilot stations have been equipped for the purpose of studying air currents and making meteorological observations.

It is customary to release from such stations one or more balloons with a determined speed. Then by means of the theodolite a graph is prepared showing the altitude and the direction of the balloon in the course of its flight. By these tests, balloons have been observed to a height as great as 50,000 feet.

In the accompanying photograph one of the pilot balloons is being started on its flight from the steamer "Sierra Morena" in the Baltic Sea.

Planes Used to Fight Prairie Fire

CONSIDERABLE damage would have resulted to planes and equipment at one of the auxiliary fields near the Air Corps Primary Flying School at Riverside, Calif., recently, when a menacing prairie fire was approaching that field, had not the quick-witted army fliers used their heads and then their airplanes to stay the progress of the flames. It was a brand new use for airplanes and nobody knew whether they would win in the fight against the driving ground fire.

Above, the prairie fire from the air; (left) observation planes, motors full on, throwing a gale of wind to stay the oncoming wall of fire.

The fire had started in the dry grass and was sweeping down the field to where the airplanes and other equipment were parked, with large wheat fields also in the path of the flames, when one nameless hero thought of throwing the fire back on itself through blasts created by whirling airplane propellers.

There were several observation type airplanes on the line at the time, and backing them towards the fire and holding them stationary by means of the wheel brakes, the flying instructors turned up the powerful 420-horsepower engines to their maximum revolutions. This created such a gale as to keep the fire from spreading within twenty feet of the airplanes.

While the instructors were on the alert, ready to release their brakes and fly to safety in the event the flames should break through, the student fliers and mechanics proceeded to beat out the flames around the edges of the burning area.

How to Convert a Ford Model T Motor

H. G. HECKETSWEILER of Chicago makes a business of converting Ford Model T engines into airplane motors. His system is rather simple and he has given POPULAR AVIATION a brief description of his method.

Mr. Hecketsweiler tells us that every engine he has converted has had at least 60,000 miles of hard use in back of it.

"The engine," he writes, "if converted right, develops about 28 h.p. at 2,000 r.p.m., uses about 2 gallons of gas an hour, and travels 1,000 miles on a gallon of oil."

A Ford radiator can be used for cooling, or a racing-car radiator can be adapted in order to cut down head resistance.

There are two ways to convert a Ford Model T Engine into a reliable airplane engine. One way is to make a direct drive engine. The other way is to make a geared engine. The geared engine is the best performer.

There are eight ways to increase the h.p. and the r.p.m.:

1. Raise the compression ratio.
2. Install oversize valves.
3. Alter the cam shapes to obtain greater lift.
4. Bore out intake and exhaust manifolds and polish them. Also polish the cylinder heads.
5. Install aluminum pistons.
6. Install an airplane carburetor.
7. Advance timing, being sure to put in racing spark plugs.
8. Improve the lubrication as much as possible.

The first thing to do is to raise the compression ratio. This is done by having a machine shop grind off about an eighth of an inch. Next the valve openings must be reamed out to take oversize valves. If the valves are too large they will warp or break off.

Aluminum pistons must be installed next. The top of the pistons must be polished and also the cylinder head to prevent pre-ignition. The intake and exhaust manifolds must be bored out to allow easier passage of the gases.

The crankshaft must be taken to a good machine shop and drilled for lubrication. Care must be taken not to disturb the balance or weaken the shaft in any way.

The sides of the cam must be filed to allow for greater valve lift. The cams must be softened to file them. After filing they must be hardened again.

The gears must be steel. The smaller one has a fourth of an inch cut out so that it fits on the flange on the crankshaft. The timing gear should be set ahead one or two teeth.

The amateur should not attempt to cast the crankshaft or gear case. It should be done at some foundry. The following names are the manufacturers that sell parts:

Castings, pistons and crankshaft bearings, Bohn Aluminum and Brass Corp., Detroit, Michigan; oil pump, M. L. Oberdorfer Brass Co., 2204 Thompson Rd., Syracuse, New York; thrust bearing, the Gwilliam Company, 360 Furman Street, Brooklyn, New York; gears, any machine shop will be able to make the gears; valves, Wilcox-Rich Corporation, Detroit, Michigan.

What a Large Wind Tunnel Looks Like

WIND tunnels have proved of tremendous value in the laboratory testing of aircraft designs. One of the most famous tunnels was established by the Guggenheim Fund at the California Institute of Technology.

A wind of 150 m.p.h. can be developed at this tunnel. The wind is produced by a huge electric motor which serves as a fan. Dr. Millikan (left) and Dr. A. L. Klein, eminent California scientists, are shown standing beside the 4-bladed prop.

Radical Airship Designed to Travel 300 Miles Per Hour

Left, Thad Rose, the inventor, is pointing to the main air channel. The two tranverse air passages can be detected on top. Below, a front view of the strange craft. Looks like a doughnut, doesn't it?

THAD ROSE, an inventor of Van Nuys, Cal., has begun plans to build a 50-passenger dirigible along radical lines.

The proposed ship will have an air passage running from fore to aft. Two vertical air passages will run from top to bottom at either end of the dirigible.

In addition to the propellers operating externally, as in standard dirigibles, additional props will be revolved within the various air passages. Absolute control in all directions is claimed for the design.

The completed ship is to carry 50 passengers at an estimated speed of approximately 300 m.p.h. It will be 300 feet in length and 60 feet in diameter. Four motors of 250 h.p. each will supply the necessary power.

The model shown here is 48 inches long, 17 inches in diameter. Four small motors develop 1/16 h.p. and are equipped with 2-blade propellers 8 inches long. The model makes 20 m.p.h. with a 70-lb. load.

School Boys Build Miniature Airport

THE miniature airport, complete in every detail, was built by students of the Breakers High school at Long Beach, Calif. One of the model airplanes is alone valued at more than $500.

The boys had a great deal of fun building the toy landing field and the idea can well be adopted by Model Clubs in other cities.

Army Cadet Is Taken Off High Horse

"DEMOCRACY is the key-note of our Government, and it certainly exists in the local Flying-Cadet Detachment," says a correspondent from March Field, Riverside, Calif. He then goes on to say that one certain afternoon, during the recent enrollment of the present lower class at the Primary Flying School, a Packard Eight Sedan drove up in front of the Cadet Detachment. A fine looking young man with his mother was sitting in the rear seat with a dusky chauffeur driving.

The chauffeur got out and ran around to the door, grabbed a bag of golf clubs and two Gladstone bags, while the youth kissed his mother and slowly followed the chauffeur with his baggage up the walk to the Orderly Room door.

At the time watching the procedure was an upper classman with the chevrons of a Sergeant on his sleeves. He walked out to meet the new "Dodo," and in a loud and stern voice said: "Say, Mister, from now on you carry your own equipment."

The chauffeur, with big eyes and open mouth, dropped the luggage and the youth picked it up. The upper classman then doubled time the new boy with all his baggage across a well watered lawn to the Orderly Room. The chauffeur returned to the car, the fond mother returned her lorgnette to her bag and looked away in disgust while the car was turned and quickly sped away.

The youth is still with us and he has taken his discipline and likes it. They say he has the makings of a fine officer.

Plane Used to Spray Crops

FARMERS in Central Oregon were saved many thousands of dollars last summer by having their crops of clover sprayed with sulphur dust from airplanes and thus destroying mildew. It was found that the sulphur dust sprayed from a plane covered the plant leaves above and below, a thing that was not possible by ground spraying.

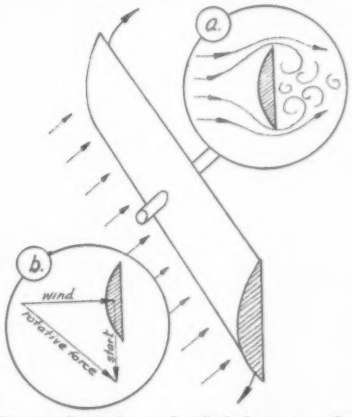
The planes maintained speeds of about 125 miles an hour. One thousand pounds of dust was usually sifted over the fields at one time. Airplanes have previously been used in the Northwest in dusting orchards and in seeding logged-off lands near the coast, but this is the first instance where it has been used on clover.

The Mysterious Revolving Stick

A PARADOX is something that contradicts itself or which apparently operates contrary to accepted laws. Generally, however, if we investigate the so-called paradox, we will find that it is not really paradoxical at all but operates according to the old established laws.

The "aerodynamic paradox" is simply a strip of "half-round" wood pivoted by a shaft at its center. At first glance, it would not seem that there is any tendency toward rotation at all with the wind blowing directly upon the blade as indicated, because the blade is not inclined to the wind-stream at any point nor is the blade unsymmetrical.

We hold this strip of half-round in the wind, and, just as we expected, it



The wood blade, and what happens when the wind strikes it. Lower inset shows the aerodynamic force that revolves the blade once it has been started.

remains stationary and without any more tendency toward revolving in one direction than in the other.

When the blade is started in rotation by a sharp flip with the hand, it rapidly gathers headway and continues to revolve rapidly as long as the wind lasts. It is not self-starting, that is all. It makes no difference which way the paradox is started because it will run either right or left handed with equal ease.

Try it yourself, some time.

"I Stand Pat:--
500 m. p. h. Can't Be Done"

Despite fervent objections by many readers, Mr. Rathbun stands undaunted, and specifically answers his critics

insists John B. Rathbun

IT IS with the deepest gratitude that I acknowledge the attention and serious consideration that has been paid to my article, "500 M.P.H. Can't Be Done," appearing in the September issue of POPULAR AVIATION.

Most of us remember the historical mistatement of the eminent scientist, LeConté: "If mechanical self-sustained flight is possible, then the power expended by seventeen swallows in flight must be equal to one horsepower."

We have only to go back to 1910 at a time when the pessimists despaired of ever attaining 100 M.P.H. with an airplane.

I also have in mind that government pamphlet in which a number of scientists made enduring asses of themselves by claiming that mechanical flight was impossible. Strange to say, this pamphlet was issued only a few weeks before the Wrights made their first flight over Washington.

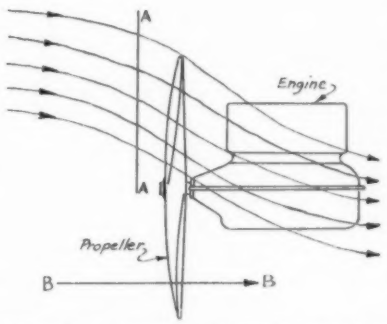
We all have heard of these stories but they should not necessarily suppress further predictions nor be quoted as a valid argument against my claims. Prediction and estimation stand for progress by diverting attention from present practice to a possibly different practice in the future.

Owing to the great number of letters received, it is impossible to reply individually to each correspondent, but as most of them advance similar arguments, these criticisms can be covered by a blanket reply. Everything from steam turbines to Brazilian horse-flies has been quoted in an attempt to disprove my theory so that a comprehensive reply will necessarily cover a wide assortment of subjects, including aerodynamics, thermodynamics, zoology, biology, chemistry, exterior ballistics and astronomy.

So far, we have not delved into botany but I expect at any minute to receive conclusive information that the fuzz of the Hocus-Pocus thistle of Siam floats through space at the rate of 1,500 M.P.H.!

And then to cap the climax, comes that prominent airplane manufacturer, Mr. Lloyd Stearman, who in a paragraph in the November issue of POPULAR AVIATION, predicts a speed of 25,000 M.P.H. in the year A. D. 1980. Mr. Stearman neglects to say whether this performance will be pulled off in April or August of 1980, but in any event it will be too late for me to witness personally, so that I will have to accept Mr. Stearman's word for it.

Whether Mr. Stearman will view the rapidly flitting landscape through red-hot windows or not, it is evident that



Although a propeller tip travels over 500 m.p.h., the air speed is considerably less. The air column rotates WITH the blade along the line A-A.

it will not be necessary to use screens in these windows to keep out the Brazillian deer-flies, who are supposed to buzz along at a comparatively moderate speed of 815 M.P.H. If any deer-flies do succeed in catching up with the ship of Mr. Stearman's dreams, then these flies will have to be water-cooled—take my word for it.

SUMMING up and classifying the arguments of the dissenters, we have the following:

1. The propeller tip argument, in which attention is called to the fact that a propeller tip travels about 500 miles per hour and does not overheat.
2. The Brazilian deer-fly theory, telling all about a fly that is said to streak through the atmosphere at 815 M.P.H.
3. The meteor argument, in which the speed of the incandescent meteor or "shooting star" is estimated at a minimum of 36,000 M.P.H.
4. The steam turbine theory, in which the correspondent states that the steam flow in a turbine exceeds 500 M.P.H. and yet the turbine does not burn up.
5. That there is no evidence that the "velocity cubed law" changes at the velocity of sound.

Unfortunately for the above arguments, certain conditions are assumed that do not hold true in practice or which, in the case of the deer-fly, are largely hearsay. They seem quite plausible when read casually, but a little investigation will show that the relative velocities actually fall considerably below the estimated values, and hence are not criteria.

To get back to Argument No. 1, the propeller theory, and the favorite of the majority of the contributors. This theory assumes, of course, that the air stream passes straight through the disc swept out by the propeller blades, which is not the actual case at all. While admittedly, the propeller tip may easily attain a speed of 500 miles per hour in respect to some stationary point, these blades do not actually cut through the air at this speed.

The air rotates in advance of its entrance into the disc and therefore travels along in the same direction as the blades, thereby cutting down the relative velocity to about 50 to 60 per cent of the apparent velocity. The blades cut the air more nearly at *300 M.P.H.* than they do at *500 M.P.H.*, and further, much of the air is taken in radially at the tips instead of passing through the disc.

The accompanying diagram shows how the air column twists and rotates in advance of contacting with the blades, the movement beginning along the plane (A-A). If the stream went straight through the disc, as along (B-B), then there might be something to the propeller argument, but the air does not act in this manner.

Just as an experiment, stand in front of an electric fan and gently blow cigar or cigarette smoke into the blades. Notice how the smoke turns with the blades before making contact with them, and also note what a large percentage of the smoke is drawn through the tips.

If you let the breeze from a second fan blow the smoke into the first, so as to obtain a translational stream, the effect will be even more pronounced. This is a graphic illustration of the principle, although an electric fan blade is not an ideal form for the experiment.

I HAVE my doubts about that Brazilian deer-fly yarn. It sounds too much like the unreliable data found in the Sunday Supplements. At this point I will split 50-50 with my opponents, for I don't know anything about Brazilian deer-flies and my readers don't either.

Entering the astronomical department, I can only say that the speed of meteors is variable, and when timed by my Ingersoll, certainly do not measure up to the specifications laid down by Lieut. Waldo Tullsen.

My arc of observation is about five miles, and one meteor was timed at 2.5 seconds or two miles per second. This measurement was taken during the September shower of meteors so common in this vicinity and shows up about 7,200 M.P.H.

However, it should be remembered

that this flight was measurable in *seconds*, whereas airplane flight is measured in *hours*. The small mass of the meteor was heated to the vaporizing point almost *instantly* in flight at this terrific speed. The speed of 1,600 miles per hour given in my article was a misprint—it should have been 16,000 M.P.H.

In considering the heating effect, we must take *time of flight* into account because it takes a definite length of time to heat a body with a limited quantity of heat.

Again, the weight and thickness of the body enter into the problem, so that it will obviously take longer to heat a heavy mass of metal with thick walls, such as a projectile, than to heat the thin extended walls of an airplane cabin.

Again, since the flight of the airplane is measurable in hours, against the few seconds of projectile flight, it is evident that the terminal temperature of the airplane will be higher eventually than the walls of the shell. In addition to the above, we have the effects of specific heat to deal with and the matter of conductance.

Anyone who has heard machine-gun bullets slapping up against the walls of a tank need not be told that these projectiles are in a semi-plastic condition, particularly when one splashes through a port-hole and lands on his flesh.

This calls for the development of a temperature of above 400 deg. F. in a small fraction of a second, and if solid lead bullets can be heated to this point in a split second, then it is certain that the 1/64-inch metal walls of an airplane cabin can attain a higher temperature in the same time, particularly if highly conductive aluminum is employed.

In the formula published with the original article, no mass comparable with the mass of a shell was considered, and it was assumed that the flight period was long enough for the temperature to rise to the stabilizing point.

Instead of being in terms of seconds the duration of flight was estimable in hours. These facts have evidently escaped the attention of my critics but are important factors to observe. Again, no conductance period was taken into account for the simple reason that the rate of transfer through a 1/64-inch aluminum wall is practically instantaneous.

Because of the great mass of metal to be heated in the case of the shell, I doubt very much whether the temperature would rise sufficiently to affect the fuse or bursting charge. However, my naval friends can hardly deny the fact that a shell is hot when it lands.

NOW comes the matter of steam friction in a turbine, a machine with which the writer has had considerable experience. There is no doubt but what the steam rushes through the blading at a tremendous velocity and that it experiences friction, but it is equally true that a great deal of heat is developed at this point.

Part of the frictional loss superheats the steam in the vicinity while the balance is conducted down and away from the blades by the conduction of the central metal discs or drums. Blades do not burn out because the heat is rapidly removed by the conduction of the metal. Steam rushing through a throttling type calorimeter overcomes friction and in so doing superheats the steam to a measurable degree. As with the turbine, a great deal of this frictional heat is removed from the venturi tube by conduction and by radiation from the surface.

The rotor blading in many of the early steam turbines, vintage 1904 to 1907, was held in place by dove-tailed inserts around which babbitt metal was poured after the blades were lined up. The boiler steam temperature averaged 300 deg. F., while the softening point of the babbitt was 650 deg. F., yet the babbitt would frequently melt out and strip the wheels!

The only answer to the melting of the babbitt was the heating of the blades by high velocity steam and the poor thermal contact made with the wheel centers, this contact being so poor in many cases that the heat was not conducted away rapidly enough. I can tell you this first-hand without looking up any authorities, for many was the night that I spent nursing these cripples.

LET me quote from "Aeronautics in Theory and Experiment," by Cowley and Levy. These authors, be it known, are members of the scientific staff of the National Physical Laboratory, the source of aerodynamic data for the British Air Forces. Mr. Cowley is a Whitworth-Scholar, a degree of eminence, while Mr. Levy holds the Carnegie Research Fellowship. These authors are quoted as follows (pages 30-31):

"For most well shaped bodies in the aerodynamic sense it may be stated that the resistance varies as the square of the speed.

"Theoretical considerations indicate, and experience has verified, that this simple law breaks down at velocities approaching that of the speed of sound waves.

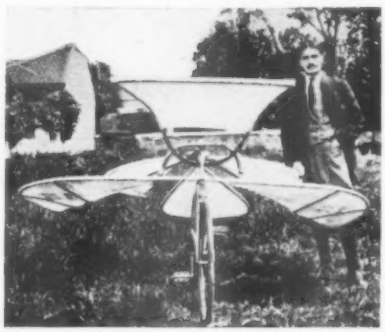
"It has been assumed so far that the pressures brought into being by the motion are not of sufficient magnitude to introduce changes in the nature of the flow due to the compressibility of the medium.

"Analysis of the flight of projectiles indicates, however, that under such circumstances this condition is violated, and along that path of the trajectory at which the velocity is in the neighborhood of or beyond that of sound waves in air, the resistance increases at a much higher rate than on the remainder of the flight path."

Other authorities quoted are F. W. Lanchester, Dines, Foucault and others, who arrive approximately at the same

(*Continued on page* 56)

A Way to Doll Up Your Bicycle



HERE is a contraption that is supposed to increase the speed of your bicycle by making use of wind currents.

It is called a "Halcyon bicyclette" and is furnished with two pairs of wings, differently sized but similar in construction. A stabilizing tail is placed above and behind the rear wheel.

Total length 10 feet; front wing 7 feet long; rear wing 5 feet; weight of empty machine about 40 lbs.

Uses for Airplanes

IN ALGERIA, a tax collector uses a plane to take aerial photographs of palm trees, as inhabitants are assessed on the number of palm trees they possess. Haiti uses planes to drop chemicals on mosquito areas and in many parts of the world airplanes are being used for aerial ambulances, particularly in sections where railroad facilities are lacking. In Mexico, the airplane has been used to dispatch payrolls over areas where banditry existed.

Planes are used in Bolivia to transport flake gold from mines to seaboard. In Alaska flying planes are used to spot schools of fish, while airplanes carry diamonds from the Namaqualand fields to Capetown. Furs from Siberia are flown over Bering Sea to the Alaska railroad.

Grand Design Expected to Carry 600 Passengers

THE model of the plane in which the inventor hopes to cross the Atlantic in the near future with 600 passengers in 12 to 15 hours. It is called a Heliplane and it rises straight off the ground without any preliminary run. The odd-looking machine is on view at the International Inventors Exhibition at London, England.

XUM

Methods Used by Pilots to Battle Fog

FOG flying is a hazard which has by no means been thoroughly overcome. Fog has bothered shipping interests since the time of Columbus, and it plays no small part in the hindrance of airplane, automobile and other means of transportation today.

We know that we can, if our airplanes have the proper equipment of instruments, take off and go up through the fog and fly above it. However, we must also know the thickness of this fog approximately, and, to make it safe, we must know what the next move is going to be; that is, we must know approximately how far the fog extends over our route. We must know what ceiling we have under the fog at several points en route to our destination. These data the U. S. weather bureau gives us before starting on a flight. We must also know the temperature, lest the moisture in the fog turns to ice and overloads the plane. This only happens in extremely cold weather.

Now, as to landing in a dense fog—it is not to be supposed that the pilot is anything but human, and the human eye can not penetrate fog, and, to date, there are no instruments perfected that will enable a pilot to land a transport plane in dense fog. And we do not play luck! You can understand now why an airplane sometimes may appear to you to be lost because it is flying around apparently in circles over an airport which is fog bound. In reality, the pilot knows just what he is doing all the time and if you could ask him, he would in all probability tell you he was waiting for the fog to lift. If he didn't know by his weather report that conditions were such that it would lift and dissipate, he would have landed at some other airport where there was no fog.

The pilot invariably knows how far it is to a good landing field, and he always reserves enough gasoline to get there. However, with the installation of the radio telephone in each ship, a large part of this hazard will be eliminated. The pilot will fly over his airport and will be notified from the ground as to the amount of ceiling under the fog, and if there is sufficient ceiling he will go down through the fog and land. No pilot will go down through the fog without knowing the conditions on the ground.

One can take an airplane off in the very densest of fog, but as yet it is not considered practicable to take a big, heavily loaded transport off without enough ceiling under the fog to enable the pilot to make a landing in case the motors were not properly functioning on the take-off.

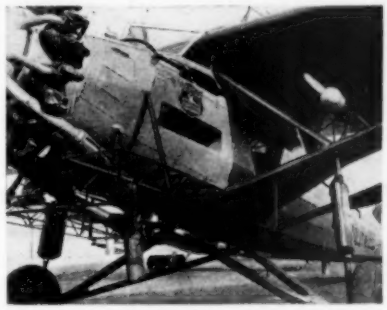
Endurance Plane Requires Special Construction

PERHAPS you would be interested in a few details about the Mendell-Reinhart ship. This Albatross monoplane, powered with a Wright 300 H.P. engine, was recently used at Los Angeles airport by these two pilots in their attempt to break the endurance record.

The most radical feature of the endurance plane is a studio room situated between the rear sleeping quarters and the cockpit. The sound proofed studio is claimed to be 60% effective.

Heavy building paper was used on the interior of the flying studio, and Dry Zero Blanket, special airplane sound proofing material, over the outside. Regulation airplane linen was stretched over the entire framework.

Note the sliding ring on the bar to which Mendell is holding. This ring is clasped onto a safety belt of the mechanic working on the motor while in flight. The catwalk is extra braced wire mesh. The spotlight underneath the catwalk is used for signalling.

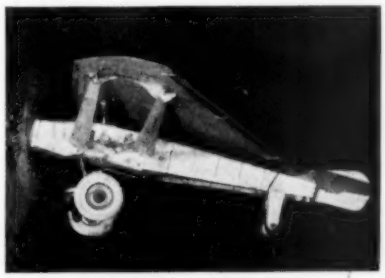


Above, a view of the heavy wire mesh catwalk. Left, Loren Mendell is leaning out of the "radio studio" sound proof compartment.

The Caterpillar Club

THE standing of the Caterpillar Club at present is 271 names and 283 emergency jumps.

It is difficult to keep an accurate check on civilian flyers who have made emergency parachute jumps, for the reason that they are not required to render reports. The only source of information on such jumps is the newspapers. The unofficial historian of the Caterpillar Club is the editor of the Army Air Corps "News Letter."



Army Officer Offers New Wing Design

CAPT. J. M. MILLER of Washington, D. C., has designed a new type wing section for airplanes.

His "kite"-shaped wing design is believed to provide increased lift.

The ailerons are hinged on the angled trailing edges of the wing, running along the entire length, thus receiving the force of the slipstream from the propeller. This design was intended to reduce landing speed and allow a quicker take-off.

In horizontal flight, the ailerons can be used as stabilizers.

Why Private X Failed to Salute Lieut. H.

THE following little episode occurred at a Special Courts-Martial trial at March Field, Riverside, Calif., recently:

Private X was being tried for being asleep on post. Lieut. H, the Officer of the Day at the time of the alleged occurrence, was the accuser. It was brought out that when Lieut. H made his inspection at about daylight, he found Private X sitting down and apparently asleep.

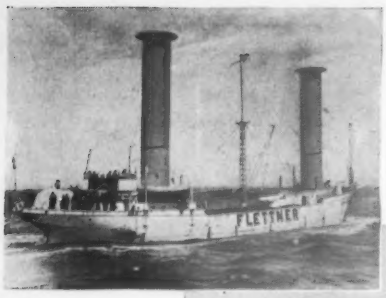
The accused took the stand in his own behalf and strongly denied that he had been asleep. His post at the time was the sentry box at the main gate. He claimed that he was sitting down on the seat provided for him when Lieut. H approached. It was just dawn and he saw Lieut. H approach the sentry box in his large sedan. He recognized him but made no effort to get up and render him the proper military courtesies. All of this he admitted.

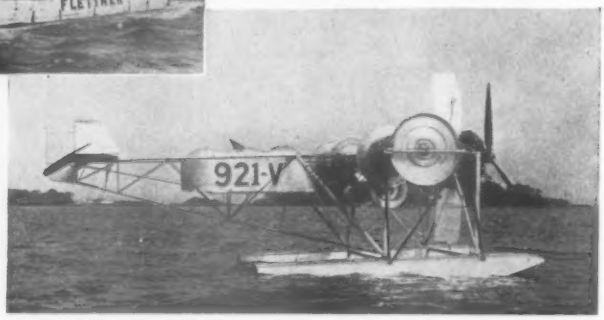
When asked by a member of the court if he knew his Eleventh General Order, he said: "Yes. To salute all officers and all standards and colors not cased." This was correct, and the member then asked him why he did not come to attention and salute Lieut. H as he should have.

To this, Private X replied: "Sir, the Eleventh General Order specifically states that you are to salute all officers and colors and standards not cased and, therefore, I could see no reason why I should have jumped to attention and saluted Lieut. H when he drew up to my post. Lieut. H was cased, in that he was enclosed in a big sedan."

The members of the court were undetermined as to whether the accused was the dumbest individual in the world or one with a very clever analytical mind.

New Rotor Plane Has No Wings





Above, The Flettner ship which traveled across the Atlantic Ocean in 14 days during 1926. The rotors provided the necessary power. Right, The Rotor airplane, which has aroused considerable interest, will lift 10 times the load of an ordinary airplane.

IN THE early Spring of this year a tugboat towing a large canvas-topped barge moored off Hen Island near Marmaroneck on Long Island Sound. When the barge was securely anchored, the tugboat departed and through the ensuing weeks a great deal of activity took place beneath the canvas top.

Curious Marmaroneck folk who sailed near the barge were gruffly warned off by an armed watchman and for several weeks nobody knew what was the mysterious cargo that the barge contained.

One day in the early summer, however, the canvas was removed and a curious looking seaplane made its debut on the waters of Long Island Sound.

Its fuselage was tubular in construction and partially covered. It appeared to have a Pratt and Whitney rotary motor and was equipped with Edo floats. The queer part of this mysterious plane, however, was the wings—or, rather, cylinders, for, instead of having wings, a cylinder protruded from each side of the fuselage. These cylinders were turned by small converted motorcycle motors on either side of the wing.

The mysterious plane was a rotor plane—an aerial adaptation of the German experimental rotor ships that employed the wind in a cylindrical fashion for forward motion as well as lift.

Two men clambered into the cockpits, started the motors and arose to a height of approximately eighteen feet, the rotor plane went out of control and plunged heavily into the water.

Not even the Marmaroneck police were able to ascertain the names of the men whom they rescued none the worse for their wetting. To Patrolman Otto Visschur, the men confided that "they were carrying out rotor plane experiments for the Government."

The rotor plane was hauled back on the barge, the canvas raised and more activity ensued, with the watchman more vigilant than ever.

During the last week in September, a tug again appeared and as silently as it had arrived, the barge disappeared.

Combing the harbors of Long Island Sound in a motor boat, Doc Schnurmacher, a representative of POPULAR AVIATION, was unable to find hide nor hair of the departed mystery plane.

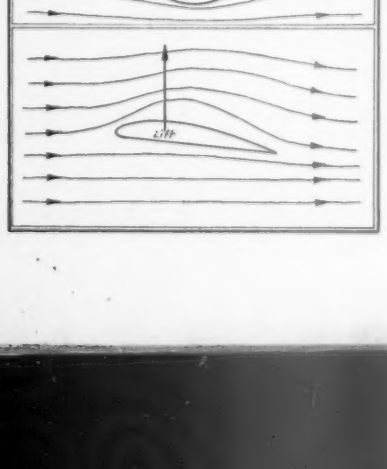
Whether the project, financed by a wealthy syndicate of aviation enthusiasts, was abandoned or whether preliminary tests were actually completed for the Government, time alone will tell.

The rotor cylinders are closed at the ends with flanges which are larger than the cylinders. Flanges are about four feet in diameter and the cylinders proper are more than two feet in diameter. This arrangement has a total span less than the conventional planes, thus making storage space smaller.

It has been stated that the plane will lift almost ten times the load of an airplane of similar weight and wing area, with reduction of the resistance so that greater speed will be possible when stress details have been computed.

If this strange design should prove successful, it will be an ideal fighting plane. A plane with the speed of a pursuit ship and the carrying power of a bomber would spell disaster for many a cumbersome battleship.

The revolving drums affect the air stream in the same way as does the standard airfoil. In both cases, lift is created by the air pressure underneath and the vacuum on top.



An Introduction to the European Aerodromes

TEMPLEHOF airdrome at Berlin can be reached by street cars which load and unload at an underground station at the edge of the field, while by taxi or bus it is only ten minutes ride from downtown Berlin. It is easily the most accessible of all overseas airports.

It is the chief terminal of Luft Hansa, largest of German air lines, which owns and operates 160 planes, of which 40 are tri-motored. About 50 per cent of the planes are Junkers. The moving about of large planes on the concrete surfaces of the field is easily done by one man operating a small, electric lift truck against the tail skids.

The Germans are intensely interested in flying. On some Sundays 5,000 people pay admission fees to enter the grounds and between 5,000 and 10,000 are outside watching the movements of the planes from various points of vantage.

Le Bourget field of Paris is more than an ordinary airport. It is virtually a union air station for all Europe. In the spring about eighty passengers arrive and depart daily from this terminal but summer travel usually increases this number to 200. The record number of passengers carried on any single day was last summer when 353 made use of the planes.

The most impressive hangar overseas is to be found at Munich. The Luft Hansa building there is a structure 165 feet square and 70 feet high of brick and steel construction and with a great number of skylights in the room. There is also a handsome building of concrete and stucco, four stories high, about 150 feet long and 40 feet wide, which will house baggage, customs, ticket selling offices, restaurant, waiting room, radio, weather and all administrative work.

These two buildings are in one corner of the field, which is level and smooth and about 6,000 feet to 9,000 feet in size.

Tablada, the airdrome at Seville, has the most attractive surroundings of any in Europe. The army officers' quarters at this field consist of a handsome building erected in a park of about two acres with flowers of every description surrounding the structure.

The whole layout of Croydon airport at London compares favorably with any other in Europe but its hotel accommodations are superior. On the field is a forty-room hotel where all conveniences to the traveling public are provided. Croydon is one of the few fields in Europe at which engines and planes are built. The Cirrus Company produces motors in a plant at Croydon and the DeSauter plane is also manufactured in a plant at this field.

Most of the overseas flying fields are military in character first and commercial second. Virtually all of the European fields were originally army airplane bases and even now the military phase predominates.

Is the Airship Safe?

The recent tragic disaster to the R 101 has focused attention on the lighter-than-air ship. This article discusses the safety factors in current airship design; and the causes of accidents

by

W. E. BURTON

NO MATTER in what kind of a vehicle you are riding, your greatest interest is in your safety—whether you will arrive in a horizontal or vertical position. And that is particularly true when you are traveling by air.

When reduced to a passenger-mile basis and compared to other modes of travel, the airplane has a high degree of safety; and is becoming more reliable every day. But the airship has hung up an even more remarkable record. Furthermore, engineers, working with modern materials and methods, expect to make the airship safer than any other form of conveyance in existence. Even today, it is frequently more hazardous to cross a busy street than to make an extended trip in a dirigible.

"But people have been killed in airship disasters!" someone exclaims.

True, but the number of casualties has been remarkably small. When thinking of airship disasters, you must keep in mind the fact that the airship

is an older vehicle than the airplane; that considerably less than 200 dirigibles have been operated successfully, and only a few of these have been used for commercial passenger service. But despite their small numbers, passenger-carrying airship have flown distances that reach an impressive total.

Suppose we review the few outstanding airship disasters. Count Ferdinand von Zeppelin, when he began to build airships at the end of the last century, had to make the most of available materials and meager experience. Naturally, some of his ships met an untimely end.

A few of the early Zeppelins were wrecked by storms, the inflammable hydrogen gas sometimes being ignited in the process. But, outside of the war, no one was killed in the many ships that Zeppelin built and operated.

The R-33, British airship that broke up while in flight over the Humber river, carried hydrogen gas in its envelope. And that explains the accident which cost the lives of most of its crew. The gas was ignited in some manner, and the resulting explosion tore about the ship's framework. Today, such an accident is impossible with the helium-filled dirigible.

The Roma, which met disaster by burning, following a crash in New Jersey, was also hydrogen-filled, hence the resulting fire. But this ship was structurally unsound in the first place. It never flew on an even keel, but proceeded with its nose down. Its control surfaces at the tail resembled a pair of huge box kites. It is believed that the fatal accident was caused by the wind catching this kite-like arrangement, and turning the ship over.

Everyone remembers the disaster which befell the Navy airship Shenandoah over Eastern Ohio. The ship, running into a line squall, was torn in two, its frame being too weak to withstand the tremendous stresses imposed. Several lives were lost, but the most significant part of the accident was that many lives were saved because a portion of the ship could be flown to earth as a free balloon.

The presence of helium gas prevented fire that probably would have resulted if hydrogen had been used. But the accident, even though it cost several lives, revealed some of the faults of the airship of that day—weaknesses which have been eliminated in the newer dirigibles.

The tragic fate of the R101 is still fresh in our minds. This disaster which took the lives of nearly a half-a-hundred men undoubtedly will serve to shake confidence in lighter-than-air craft. It should be borne in mind, however, that this British dirigible was a reconstructed job, structurally open to question. In addition, the R101 was filled with inflammable hydrogen.

ONE OF the most recent airship mishaps involved the helium-filled air yacht Puritan of the Goodyear-Zeppelin Corp. This ship is of the non-rigid type, and has a gas capacity of 196,000 cu. ft.

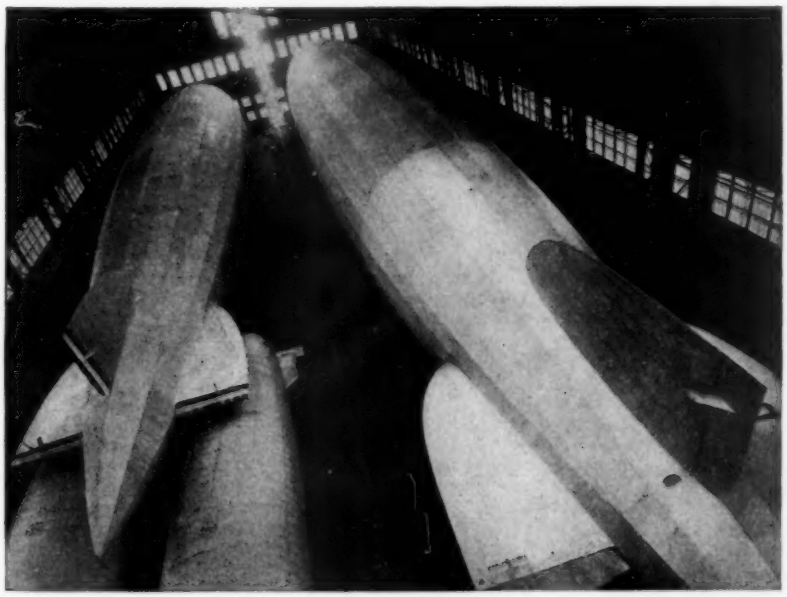
The Puritan, with pilot and mechanic aboard, was en route from Akron, Ohio, to Miami, Florida, by way of Gadsden, Alabama. It left under favorable weather conditions, but while flying over the Kentucky mountains in a heavy fog, and before daylight, bumped into the highest peak in that part of the state.

It did not actually hit the peak, but struck some trees on its top. The branches tore the fabric envelope, releasing the helium gas, and the car settled to the ground.

The damage consisted of a ruined

Left, An unusual late afternoon photo of the Goodyear blimp "Defender" at rest at the Cleveland Airport. Note the shadow of a sister blimp from which the picture was taken.

Below, A full house at the Lakehurst Hangar. The Graf Zeppelin, the Los Angeles, J-3, and J-4 can be recognized by their respective sizes.



gas envelope, two broken propellers, and a dent in the rear of the cabin where it settled over a rock—in all, representing about 1/5 or 1/6 of the value of the ship.

Conditions surrounding the accident are significant because they reveal something new about air travel through cold air. The most dangerous temperature for an aircraft to fly is just at the freezing point, when water vapor quickly forms into ice, coating wing surfaces, propellers and other parts of an airship or airplane. The Pilgrim, in flying from below-freezing temperature in Ohio to the warm air of Alabama, had to pass this point.

Shortly before the accident, according to Pilot Smith's account, the ship was flying in a cloud at an altitude of about 4,000 feet. A thermometer stuck out of one of the windows to measure the outside temperature soon was coated with ice.

Ice also formed on the propellers, broke up when the coating became heavy enough, and the pieces were hurled against the cabin, bag and fairing between the two. In an effort to escape the ice, the two flyers descended to a lower level. By pure chance, they came down at just the right place to run into the hilltop trees, with the results noted.

Smith explains the formation of ice on the propellers, thermometer, and other equipment by the fact that the whirling blades acted in the manner of an ice cream freezer, stirring up the cold, moisture-laden air so that ice was formed immediately. There was very little ice on the envelope of the airship, contrary to early reports.

If an airplane had encounted similar conditions, it undoubtedly would have been completely wrecked, with perhaps a resulting disastrous fire. But the Puritan merely settled down in a careless but gentle manner, and no fire resulted, partly because the gasoline tanks are carried in a fireproof compartment in the cabin, at some distance from the motors, where gasoline cannot be spilled over the hot cylinders.

AIRSHIPS of the future—the immediate future—will be far safer than any before constructed. The ZRS-4, now being built in the Goodyear-Zeppelin Corp. airship factory and dock at Akron, will represent the last word in safety, as well as in other features. Great structural strength, accessibility of parts, and elimination of fire risk, largely through the use of Helium gas, will do much to reassure occupants of the craft.

Sufficient structural strength has been provided to meet almost any emergency. Violent maneuvers of the rudders in all possible combinations will not cause failure of any part. Flying at excessive angles will not cause the hull to be strained or broken, and flying into a vertical gust of air having a relative speed of 60 feet per second and a sharp border line would be theoretically possible without failure

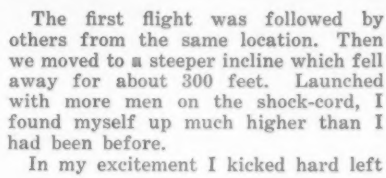
(*Continued on page* 62)

My Experiences at the Cape Cod Glider School

By Arthur L. Lawrence

I ARRIVED at the Cape God Glider School, South Wellfleet, Mass., about 10 on the opening day to find that one other student, Jake Fassett, was there ahead of me.

About 10:30 Jakob Busch, the German glider expert, opened the doors to one of the hangars, the mare was harnessed and hitched to a Zoegling primary training glider, and a little party consisting of instructors, students and a launching crew started for the dunes.



Right, "The mare was hitched to a Zoegling primary glider and the little party started for the dunes." Below, a crew is seen dragging a glider over the top of the 100 ft. sand dune after a successful flight.

A location for instruction was selected; the glider was placed on a knoll several feet high with a long plank for a runway. The sand sloped away gently from the base of the mound toward the direction from which the wind was blowing. It made a fine, safe place from which to take one's first flight.

I sat on the narrow board seat and buckled on the safety belt, placed my feet on the rudder bar, took hold of the strap over my head with my left hand and the stick with my right. A steady wind blew and for a while I balanced the craft on an even keel by moving the ailerons. Busch instructed me to keep my eyes on the horizon.

Finally, as I seemed to have got the knack of keeping the ship balanced, I was told that I could have my first hop. Jake Busch put the stick in neutral and told me to hold it there; then he took his position holding the end of the left wing. The shock-cord crew were ready, someone held onto the tail.

"Pull out!" Two men on each rope tugged away, stretching the V.

"Run!" They ran at first, but as the tension increased they were slowed up almost to a stand-still.

"Let go!" (to the man in back), and before I knew it the ship and I had started, first gradually but with rapidly increasing acceleration, so that I skimmed over the sands about three feet in the air for 75 feet, when the skid scraped once more and we came to a stop.

The first flight was followed by others from the same location. Then we moved to a steeper incline which fell away for about 300 feet. Launched with more men on the shock-cord, I found myself up much higher than I had been before.

In my excitement I kicked hard left rudder. I pushed the stick forward and dove rapidly. Realizing that I was about to crash, I pulled back on the stick and started to stall and slide off on one wing. I only partly recovered before the skid plowed the soft sand and the glider ground looped without, fortunately, doing any damage.

IT WAS not until the second day that I made a satisfactory flight—my ninth one, I think. To my disgust, I had been doing two things which were wrong. I knew how the rudder worked, yet in the air I instinctively did the opposite. Also, instead of keeping my eyes on the horizon, I had been looking down at my feet, with the result that I over-controlled the ship badly.

On the ninth flight I decided that I would make just a straight easy hop, relaxing and looking off into the distance. It worked excellently. The Zoegling zoomed 30 feet; I eased the stick forward when I felt my speed slacken, and we settled into a gentle glide and a perfect landing.

The exhilaration I felt was great, and the satisfaction of having mastered something that had seemed complicated and strange at first put me in fine spirits.

From then on, progress was steady. Jake Fassett, another pupil, David Bangs, and I were groomed for our first flight over the cliff and a try at one gull. The beach is backed by a sand cliff varying from 75 to 125 feet in height. Launched from the highest point, the student soars along the ridge for a while and then makes an S turn

as he loses altitude, gliding out close to the water's edge and back to the level sand above the high-water mark.

First we practiced S turns down the longest slope on the gliding terrain until we satisfied the instructors that we wouldn't shoot into the water when we found ourselves over the cliff 150 feet in the air.

Launched with a great deal of power, the ship and I zoomed directly for the ridge, and almost before realizing what had taken place, I had instinctively nosed her into the up-draft which swept over the edge.

I never had a busier 24 seconds in my life. I made a steep dive and left bank and turn. Feeling that I was losing altitude much more rapidly than necessary, I pulled back on the stick, stalling, but recovering in time to get her under control. In the meantime, I had forgotten about the right bank and turn. I had barely altitude enough to get straightened when the skid scraped the wet sand. A wave washed up around my feet before I had a chance to turn and pull the ship farther up on the beach.

Several flights in the Prufling, a secondary ship identical to the one in which Ralph Barnaby dropped from the dirigible Los Angeles, did a great deal to steady me on the controls. The flights over the cliff in the Zoegling were then made with the greatest ease. The feeling of strangeness and uncertainty had disappeared and instead I experienced self-confidence and a keen exhilaration.

I have enjoyed most sports, but I know of no other that offers the nerve-tingling thrill of being shot into the air at 40 miles an hour in a glider and circling over the ocean to a gentle landing a quarter of a mile away.

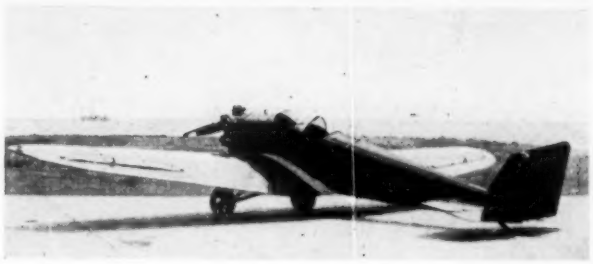
Special Telegraph Code for Aviation

VOSLYXBEPA is not the name of a new Balkan kingdom. Translated from the new telegraphic code for aviation, it means "Navy requires price on tri-motored biplane seaplane."

The ten-letter jumble represents the new aviation code, to be known as AVICO. The growing export business of the American aircraft industry throughout the world prompted the Aeronautical Chamber of Commerce to begin preparation of the code a year ago.

AVICO contains 30,000 words and phrases, which include the listing of manufacturers' names, specifications of airplanes and motors, and various terms used in export communications.

It is estimated that foreign and domestic telegraphic expenses of aviation companies using the code will be reduced 30 per cent. Apart from its economic value, it also provides maximum safety during transmission of messages by a clever and foolproof arrangement of its code words. Secrecy, which is very important to aviation, will be possible through the new code, and especially to those companies which supplement it with their own private phrases.



Aeromarine Klemm Announces Lightplane Model

The photo shows the present model "85." The new light "40" will be an adaptation of this design.

AEROMARINE Klemm Corporation have announced a new lightplane model to sell for $1,990.

The new ship "Light 40" will not be ready for production before the first of the year.

At present they have completed simply an experimental ship. As soon as models of the new type are produced, POPULAR AVIATION will publish complete particulars.

The present model "85" sells for $3,750, differing from the new "Light 40" principally in weight and power. The figures 85 and 40 represent the relative horsepowers of each model.

Home-built Plane Powered with Ford Engine

THE little two seater monoplane shown in the accompanying photograph is powered with a Model "A" Ford engine. The Model "A" engine seems to be a good power plant for a home-built plane, since it is light in weight, very reliable, has plenty of power and a minimum of vibration.

This ship was built by Paul Parsons and Joe Foster of Anderson, S. C. The fuselage is of welded steel tubing. The span is 31 ft., length 21 ft., and height 7 ft. It is fitted with dual controls. With two passengers it has a good performance and a low landing speed.

In the photo the plane is shown tied down for the night with the cockpit covers in place. Plane owners who do not have a hangar should not overlook this precaution.

A Complete Record of Trans-Atlantic Flights

SEVERAL readers have asked us for a complete list of successful airplane flights over the Atlantic Ocean.

Here it is. Five westward crossings, ten eastward crossings. These trans-oceanic journeys are becoming so frequent that we had better add that this list is complete up to the eastward crossing of Capt. Boyd and Lieut. Connor.

Following are the five westward crossings of the Atlantic by heavier-than-air machines:

AUGUST, 1924—U. S. Army around-the-world fliers, London to New York with stops at Iceland, Greenland, Labrador, Newfoundland, Nova Scotia and Boston.

MARCH, 1928—Koehl, Fitzmaurice and Von Huehnfeld, Dublin to Greenly Island, Laborador.

JUNE, 1930—Kingsford-Smith and three comrades, Port Marnock, Ireland, to New York with one stop at Harbor Grace, N. F.

AUGUST, 1930—Von Gronau and three comrades, Germany to New York, with stops at Faroe Islands, Iceland, Greenland, Labrador and Nova Scotia.

SEPTEMBER, 1930—Coste and Bellonte, Paris to New York without a stop, 37 hours 18 minutes.

The nine eastward crossings, begun in 1919, follow:

MAY, 1919—NC 4—U. S. Navy plane under Commander Read, Newfoundland to Portugal with stop at Azores.

JUNE, 1919—Alcock and Brown, Newfoundland to Ireland without a stop, 16 hours, 12 minutes.

MAY, 1927—Lindbergh, New York to Paris without a stop, 33 hours 29 minutes.

JUNE, 1927—Chamberlin and Levine, New York to Germany without a stop, 42 hours.

JUNE, 1927—Byrd, Acosta, Balchen and Noville, New York to France without a stop, 33 hours 30 minutes.

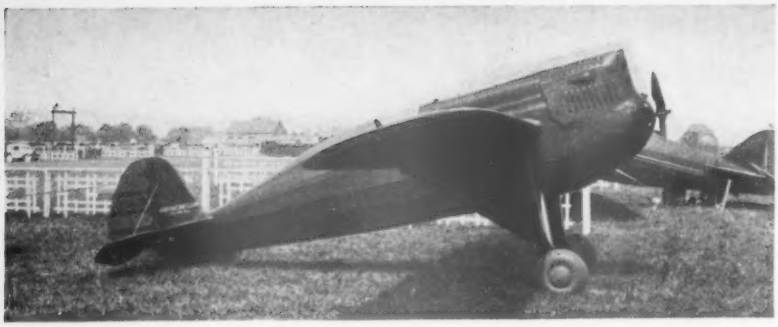
AUGUST, 1927—Brock and Schlee, Newfoundland to London without a stop, 23 hours 21 minutes.

JUNE, 1928—Stultz, Hill and Amelia Earhart, Newfoundland to Wales without a stop, 20 hours 40 minutes.

JUNE, 1929—Assolant, two companions and a stowaway, to Spain without a stop, 31 hours.

JULY, 1929—Williams and Yancey, Maine to Spain without a stop, 31 hours 30 minutes.

OCTOBER, 1930—Capt. J. Erroll Boyd and Lieut. Harry P. Connor, Newfoundland to Scilly Isles without a stop, 24 hours 5 minutes.



Mono Offers Inexpensive Racing Plane

MONO Special was built by the Mono Aircraft Corp. and flown in the All American Flying Derby.

It has a high speed of 164 miles per hour. It is powered with a Cirrus of 110 horse power, equipped with a De Palma supercharger and a standard steel propeller.

The landing gear is rigid, the entire shock being taken by the Goodyear air wheels. The plane is priced at $3,500.

Outboard Motor Tows Water Glider

THE Southern Aircraft Corporation announces the successful test of their Hydro-Glider named "Air Boss."

The Glider shown in the illustration is equipped with pontoons, the large central pontoon on which the pilot sits when taking off and when in flight, and two wing pontoons.

The take-off speed is between 18 and 23 miles per hour in still air.

Experiments in towing this glider have shown that it will readily climb to altitudes of 1,000 to 1,500 ft., and of course it will stay in the air as long as it is towed.

Reader Suggests Radical Motor

MARTIN CAVANAUGH of Detroit has an idea that airplane engines should be redesigned with a view towards better streamlining.

His idea, submitted to POPULAR AVIATION in sketch form, calls for cylinders of varying sizes. The engine would be an inverted type. No doubt his idea suggests better streamlining than does ordinary engine cowling—but the design rather interferes with some engineering principles.

The Old Wright Motor

MOST aviation enthusiasts are familiar with the appearance of the early types of aviation engines, but few are acquainted with some of the mechanical details of the old Wright motors.

One of the early models was a water-cooled, four-cylinder, four cycle motor. The cylinders were vertical and in-line. The bore was 4.3375 inches and the stroke, four inches. It was rated at 30-35 H.P. and weighed 180 lbs.

The cylinders were of grey iron, individually cast. The water jackets were aluminum, held in place by steel bands. The valves were located in the cylinder head. The inlet valves were automatic in action and the exhaust operated by rocker arms. The camshaft and crankshaft were cut from a solid block of nickel steel.

There was no carburetor, but the inlet valves were joined together by a pipe, and a gear pump and injector supplied fuel directly to the mixing chamber. Thus the amount of fuel supplied to each cylinder was controlled by the speed of the motor. This is similar to the fuel injection system employed on the new Packard-Diesel engine. The gasoline consumption was about four gallons an hour.

The chief lubrication system of the Wright motor was the splash system. A centrifugal water pump was located on the forward end of the motor. Three gallons of water was sufficient for six hours flying.

A Mea high-tension magneto was used. It is interesting to note that the only means for controlling the engine speed was by advancing or retarding the spark. A foot operated spark lever served as the throttle. A catch on the magneto held it in retarded position so that the pilot could start his own plane. A rod was provided which when pulled relieved compression.

In starting, the propellers were turned, with compression off, to prime the cylinders. The compression rod was then pushed in and the propellers given a quick turn. When preparing to land, the compression was released and the props turned slowly from the air pressure. In an emergency, compression could be restored by pushing back the rod.

Twin sprockets were screwed and locked to the crankshaft behind the flywheel. These sprockets drove the two propellers through nickel steel roller chains. The gear ratio was 11 to 34.

A Brief History of Ben Howard, "Pylon Polisher"

DESIGNER, builder, pilot and winner—that's Ben O. Howard, 26-year-old hero of the National Air Races in Chicago.

Born and educated in Palestine, Texas, Howard spent many of his boyhood hours about the hangars of the army air corps at San Antonio.

On his twenty-first birthday Howard made a test flight of a plane of his own design and construction. It flew, and it flew so well that a Texas flying service persuaded Howard to sell them the plane. It was flown steadily for three years, when its life was cut short by a hangar fire.

In the fall of 1928 Howard gained employment with Universal as an air mail pilot. All of his spare hours were spent in building a mystery ship at St. Louis Municipal Airport—even spending many hours in his home's cellar sketching plans and building airplane parts.

Early in August the secret came out. Howard had designed and built a racing plane for the National Air Races.

A tiny craft, 20 feet long and with a wing-spread of 19 feet, powered by a Wright-Gypsy 90-horsepower motor, Howard said would "make 200." The day of the test came. Howard, dressed only in a mechanic's coverall and sock feet, because the cockpit was so small he could not dress normally or wear a parachute, went aloft and proved his experiment. No changes or adjustments were necessary—the design and construction were perfect.

The rest is history. Howard's "bullet" was the sensation of the races. Engineering authorities, after inspection of the craft, declared no plane now flying of less than 350 horsepower could outwing it. His skill and daring in competition won him the title of "pylon polisher," and seven victories, five firsts and two third places—the greatest string of victories ever run up by one individual in air speed competition.

"What chance can he have in the Thompson Trophy Race?" was the question on all sides. True, the chances did not look favorable, considering Capt. Arthur Page's great 800-horsepower craft and "Speed" Holman's great and fast speedster.

But—the Howard special finished third for an average speed of 162.80 miles an hour over the 100-mile course.

His airplane earned two other titles at the races. It is the fastest 90-horsepower airplane ever built, and it is the first 90-horsepower airplane ever to place in one of these national air classics.

You'll have to take our word for it, but this is a picture of Capt. A. W. Stevens. He is dressed up for an altitude flight.

The Perils of Altitude Jumping

by WALTER RALEIGH

Is it possible to jump from 25,000 feet—without an oxygen tank? It has been done. But what a thrilling jump!

LASHED and wipped about by a 120 mile-an-hour gale, more than four and a half miles above the earth!

On the verge of suffocation, caused by the loss of oxygen tank!

Compelled to cling to ropes and straps attached to a parachute for fear that a whirling cross current might weaken and cause them to break!

Such was Captain A. W. Steven's experience, when he went aloft to make observations and record experiences in descending from a record height of nearly 25,000 feet.

Dropping down from a region where the air is thin and bitter cold has disproved the old theory that mankind loses consciousness or that a long and very swift fall will produce death. This is not true. A long fall is merely an extended short one and the jumper is able to jump, move, think, and act just the same as when on the ground.

Jumping from high altitudes as did Captain Stevens and making photographic records gives accurate scientific data, tests the strength of equipment and helps to prepare for a future day when there will be no great fear of high altitudes and high flying.

Captain Stevens suffered no ill effects from his long plunge although it was disagreeable. "For a long time I have wanted to make a parachute drop," he explained, "primarily to obtain first-hand information as to the sensations one feels.

"When the plane reached its ceiling, I made ready to jump—to 'bail out.' Bidding my pals goodby I jumped. The opening of the parachute caused the oxygen tank to become loose from its fastenings on the front of my clothing. Grasping it with both hands, I endeavored to retain it.

"The wind which was traveling at a speed of 120 miles per hour, whipped the parachute around like a jack straw. I was forced to use both hands on the ropes and straps which held me to the 'chute, in an effort to prevent swinging like a pendulum. It was then I lost the tank.

"It was all an experiment I shall never forget. Before settling down to a lower altitude I thought my time had come, as I was nearly suffocated due to the rareness of the atmosphere. Dropping out of the gale into calmer atmosphere below, I quickly recovered.

"I landed about twenty-five miles away from where I left the plane. The descent took exactly thirty minutes."

JAMES T. Clark of the Navy, who hopes to jump from a still higher altitude than that of Captain Stevens has made a hundred or more jumps from various altitudes. He has attended the Parachute School where he took and passed a twelve weeks course in six weeks.

There is one thing that the high 'chute jumpers learn and that is to do all possible to control their great ballooning bag of silk. This is sometimes a very vital necessity. It was once with Clark.

"I had given instructions to the pilot before taking off to fly down the center of the field," he said in telling about this experience, "but he must have misunderstood me, for he came down the edge of the field. Had I jumped over that place, I would have landed in a graveyard. Afterwards I thought I should have jumped anyway.

"Up there in the air I yelled to the pilot to turn over into the center of the field and he gave the rudder a hard left. I was standing on the wing at a point where it joins on the fuselage and holding onto the cowling of the cockpit. Immediately the plane went into a tight spin. I couldn't get into the plane because centrifugal force prevented me. We made three turns and lost about 400 feet. The pilot was horrified. His eyes were as big as saucers.

"I decided to leave the plane. In that moment before the plane began its fourth turn I shoved off free. But this was not the end of it. I was falling downward and the plane was spinning down directly on top of me. I was afraid to pull the cord because my descent would be checked and the plane would land on me. So I continued to fall free.

It was one mad race. I kept watch-the ground and then the ship.

The ground kept coming up faster and faster. I had to do something. So I pulled the cord. The 'chute unfurled and at that moment the plane stopped its spinning but only about 100 feet above me.

"My only thoughts on the way down were to get the 'chute open and keep clear of the plane I thought was going to spin into the ground. This belief about your past, present and future coming up before you when you fall is all wrong. I could think clearly and move easily. I didn't realize though, what a close call it was until I landed and had time to consider all factors.

"The people on the ground thought it was a wonderful exhibition. They

Our male pilots are not the only ones who attempt altitude jumps. Here we see Miss Bernice La Balter, 22. The men are adjusting a barograph on her leg. She later made a record jump of 17,000 feet.

were all enthusiastic. But there were a few pilots there and they were white and scared. They didn't tell the other people, though, just what a good show they did see."

IT HAS taken the strength of the parachute to disprove the old theories about falling. There was no way to do this until the 'chute was perfected and made a sure thing that could be opened at will.

Bert White, is another parachute jumper from the higher altitudes that discovered that falling has no special effect in thought and action.

Bert is a Southern boy and only twenty-eight years old. He was determined to break the world's record for a parachute jump. He had faith enough in silk to do this.

He discovered too, how it feels to hurtle earthward from 25,000 feet and due to unusual conditions, fight for consciousness, because of the thinness of the air.

It was out over the Mohave Desert in California that he made the long jump. He had previously made more than a hundred and fifty parachute jumps, so the mere leaping into space was no novelty.

"The altimeter on our ship was dancing around 25,000 feet," said Bert in telling about it. "It stuck there, but Earl Gordon, climbed for fifteen minutes after that. We climbed until we could feel the danger of blood vessels breaking.

"About that time I noticed I could hardly see and my tank of oxygen was down to 25 pounds pressure. It was nearly 3,000 pounds when we took off nearly two hours earlier. I started to walk to the door of the plane to jump, but was hardly able to crawl. My oxygen was going fast. I took one long breath, tore off by mask and fell out of the door.

"From then on events are not clear. I don't recall the jolt of my 'chute opening. For about 15,000 feet everything was hazy. This was due to the rareness of the atmosphere and the fact that I was forced to remove the oxygen tube from my mouth.

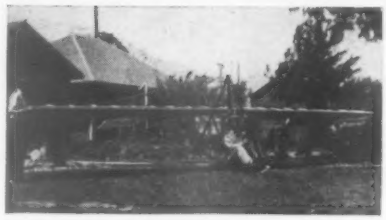
"For about 3,000 feet after I could again think clearly, I looked around and all about me. When I tried, however, to get my hand warm—I had lost a glove somewhere—I didn't have the strength to lift it. My hand was frozen.

"As soon as the air became heavy again, around 10,000 feet, I was strong enough to begin pulling the shrouds of the parachute, so I could drop faster.

"It must have been fifty degrees below zero when I bailed out. I had no particular sensation of being cold, but I was kind of numb all over. The pilot told me afterwards that he too was unsteady, for he circled around for some few minutes looking for me, but he could not see me.

"From my experience, I believe that a flyer could jump without oxygen equipment but with an automatic parachute opening cord and thus sail down easily to earth."

How I Built My Glider for Only $70



Duane Paxton in his $70 glider.

I HAD been wishing for a real Glider for some time but unfortunately had not been able to find the necessary two or three hundred dollars. One night while looking through the POPULAR AVIATION magazine I struck upon a plan and determined to try it the following day.

The next morning I first made a list of the amount of wood I thought would be necessary to build a Glider and promptly guided my steps to the local lumber yard. Here I found that I could buy any desired amount of sugar pine, which I had been told by an Aviator friend, was as good for Glider building as Aircraft Spruce.

I bought the required amount of wood and it was immediately delivered to my home.

At this time I hunted up a magazine article on "How to construct the Gottingen 365 wing." Deciding that this wing would be much too heavy for my Glider, I set to work and decreased the measurements of the rib. That is, I made the rib 5 inches wide at its widest point whereas it had been 7 inches before. In other words making a two inch decrease in the height of the rib.

This two inch decrease was followed throughout the building of the ribs. After completing the twenty-two ribs necessary I then slipped them on the spars at fifteen inch intervals, eleven ribs to each section. Thus I completed the hardest, although most interesting part of my Glider.

In another issue of the magazine was published the details for building the tail assembly of the plane on which the Gottingen wings had been used. Here again I followed my two-inch decreasing plan and in a few hours proudly surveyed the product of that day's labor.

Again turning to my Aviator friend for advise, I learned that for covering material I could use a certain grade of Hope Muslin which would answer the purpose very well.

I secured about 40 yards of this material at a bargain price of 19 cents a yard. I spent about two days covering the wings and tail assembly and found it to be a very particular as well as a very tedious task. However, I finally finished and laid aside the wings for the next problem, the fuselage.

I decided to construct the usual wooden type fuselage for my Glider. I consulted a table of scales published by the Dept. of Commerce at Washington and found that by use of these and a little of the hard learned Geometry I could build my fuselage.

It took me nearly two days to construct the fuselage, but when it was finally finished it seemed very solid and substantial. After attaching all the necessary fittings, etc., to the fuselage I then secured the bracing wire from our local hardware dealer for about $3.00.

Again taking up the wings I now proceeded to dope them. I bought a very fine grade of Berry Bros. Dope from a paint store for $1.90. This price saved me about thirty or forty cents. (It pays to have paint store owners for friends.) I bought five gallons and it just nicely doped my Glider three coats.

The covering that had been merely cloth before now was the toughest fabric one could imagine.

Now I proceeded to attach the wings to the fuselage. This was a comparatively easy task, and it was not long before the wings were in place and the flying and landing wires securely in place. Then the tail assembly was put in place and its brace wires drawn taut. This last operation was completed only three weeks after I began.

In flying the Glider a long flexible stranded wire attached to an automobile was found to be the best means of towing the ship into the air. With the first towing, the ship ascended about fifty feet for a perfect glide, and low and behold, there was the vision of my dream, a $300 Glider in the air! And for only $70!

I have just completed a new model Glider of my own design that I believe will be a very great success. I have been working on the details of this Glider for quite some time and with the promise of some very influential backing I intend to put my new Glider on the market very soon.

Being only eighteen years of age myself I fully realize the desire of many young men or women to own a Glider of their own and enjoy the real American sport of Gliding. I intend to market my Glider at a low price both in Kit sets or ready built Gliders, within easy reach of young people of moderate means.—*Duane T. Paxton.*

Solo Students Get Instruction by Radio

A NEW practice has been evolved in England whereby a student flyer, on his first solo flight, is instructed by radio from his instructor on the field.

As is commonly known, students miss greatly the reassuring words of the instructor when going up alone for the first time. The receiving set is installed in the training planes and weighs only a trifle over four pounds. One single tuning control is employed, the range being from 600 to 1,000 meters.

Colorado Inventor Working on "Gyro-Ship"

EDGAR R. HOLMES, a Colorado inventor, proposes to navigate the air in a so-called "gyro-ship" utilizing two lifting gyros, one at the front and the other at the rear of the ship to sustain the craft in the air.

The inventor intends to use two driving gyros in a forward operating room to propel the ship in either direction, while steering is to be accomplished by a small gyradoscope placed in either the front or rear of the craft. All gyros, as well as the steering gyradoscope, are to be driven by electric motors that receive current through a series of storage batteries charged continuously by the ship's power plant.

In the larger ships it is planned to use two lifting gyros at each end of the craft—either one of which will lift and sustain the craft, while the other two are kept in slow motion as auxiliary or stand-by units ready to attain required speed in a fraction of a second in case of an accident to the lifting gyros in action.

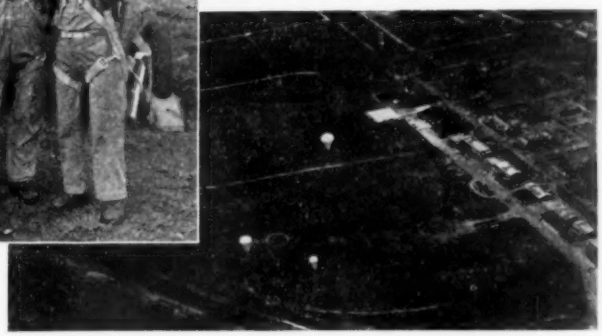
Holmes is now working on demonstrator ship (behind closed doors) which will be completed in about six weeks. As soon as they are available, POPULAR AVIATION will publish photographs.

Three Army Flyers Bail Out from Formation

ARMY Air Corps officers at Mitchel Field, L. I., announced recently that the moot point of whether an aviator might make a parachute jump from a plane forming part of a military formation without tangling with the other ships had been proved by the successful descent of three soldiers under such conditions.

Staff Sergeant James Pearson, Corporal John Marchewka and Private J. Frazio, all stationed at Mitchel Field, volunteered to go aloft for the test. On that occasion the formation of three service type Curtiss Falcons circled the field at an altitude of about 2,000 feet. At a signal from the leading ship, the three men leaped simultaneously into space.

They dropped a distance of more than a hundred feet before pulling their rip cords, thus clearing the formation by a safe margin. Their parachutes opened readily and the soldiers floated safely to the ground.

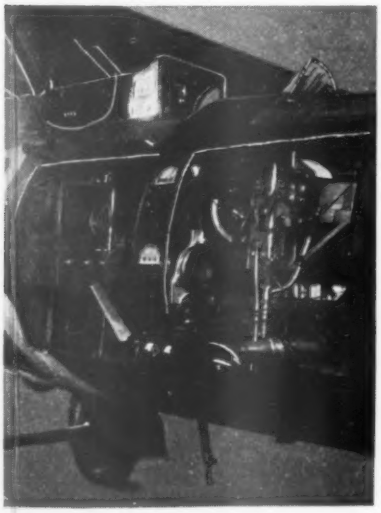


Above, The three Army flyers before taking off. Right, the flyers after they jumped from the planes in formation.

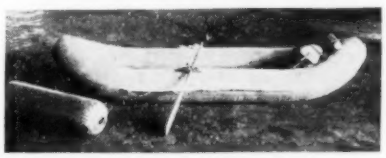
A Few Details of the "Question Mark"

COSTE's and Bellonte's flight from Paris to New York is still fresh in the minds of all of us. Pierre Marie, of Bordeaux, France, sent POPULAR AVIATION some interesting photographs and details of this famous ship.

The "?" is a special development of the Breguet 19 type, one of the world's best known military machines. It is a two-place sesquiplane powered with a 650-H.P. Hispano-Suiza motor. It is of all metal (dural) construction, fabric covered.



The pilot and navigator are in separate cockpits, one behind the other, and are well protected by snug cowlings and wind screens. Each cockpit contains all necessary instruments and controls for the complete operation of the plane. The instrument's equipment and arrangements were designed to take care of a long distance flight of from 40 to 50 hours' duration.



Above, the emergency collapsible boat carried by the flyers on their Transatlantic flight. Note the compressed air bottle and the bellows in the bow. Left, an unusual photo of the "?" with the side-panels removed, showing the multiplicity of controls in both cockpits.

In addition to the many intricate instruments and controls provided, the "?" also carried a good supply of food and drinking water, complete radio sending and receiving apparatus, and a collapsible pneumatic life boat which could be quickly inflated by the use of a bottle of compressed air.

The major characteristics of this famous plane are as follows: Span, 60 ft.; length, 35 ft.; height, 13 ft.; total loaded weight, 14,700 lbs.; high speed, 154 m.p.h.; and cruising radius, 5,900 miles.

Late Ford Model Does 152 Miles per Hour

THE fastest multi-motored transport plane in the world has been developed by the Ford Motor Company. Production of the plane, a refinement of the Ford 5-AT model, is now under way.

For military use, the new plane, powered with three Pratt and Whitney wasp motors, has a high speed of 155 miles per hour. The high speed of the plane fitted for commercial use as a passenger carrier, is 152½ miles per hour.

In accomplishing this marked advance in aeronautical design, the outboard engine nacelles have been greatly refined and ring cowls added. This eliminates a considerable amount of drag and gives considerably increased propulsive efficiency. The wheels and landing gear also have been streamlined and numerous refinements in fuselage design added.

The new Ford tri-motor is the fastest transport of its kind. The motor cowling and wheel "pants" aid materially in reducing head resistance.

How to Use Your Shock Cord

by WALTER E. BURTON

If properly handled, the shock cord will last long and be perfectly safe. Otherwise, it becomes a powerful and dangerous device. The following rules for correct usage will prove of great value to glider flyers.

THE story is told of a certain glider-launching experiment that ended disastrously. A group of glider club members, having employed rubber airplane shock absorber cord for slinging their ship into the air, reasoned that, since the cord had performed so well with man power, it ought to work better if stretched by mechanical means.

So one end of the cord was attached to the glider nose hook, and the other to the rear of an automobile. Several club members held the tail. The automobile started, ran forward, and then, *BAM!* The cord broke, snapped back —and the pilot went to the hospital for a protracted visit.

The moral of this story, according to Ray N. Ellis of the B. F. Goodrich Tire & Rubber Co., makers of enormous quantities of rubber shock cord, is that such stunts are merely foolish even if they do not always end disastrously.

Shock cord, he says, is considered the best device for launching a glider, when properly used. But when not employed with discretion, it becomes a powerful and dangerous device.

Hundreds of tiny rubber threads bundled inside a double jacket of silk form the cord. When being manufactured, the rubber threads are stretched 100 per cent, and the covering woven over them. Rubber under tension is comparatively short-lived, so every cord is dated by woven-in markers. Cord over a year old should be inspected and tested carefully before being used for glider work.

The cord, originally designed for use on airplane landing gear, is put through an entirely new set of maneuvers in glider launching. Often it is abused. Eight or ten men tug at each leg of the "V" formed when the cord is attached, at its middle, to the glider nose and then stretched out. This imposes terrific stresses which the cord never was intended to withstand. If it breaks, someone is almost certain to be hurt.

Ellis recommends that not more than five men pull on each leg of the "V," and that the cord be stretched no more than twice its length. With this amount of stretching, new ⅝-in. cord will pull 300 pounds on each side, or 600 pounds on the glider nose, enough for all purposes.

This method of launching a glider is hard on the men in the foreground, but a lot tougher on the shock cord. Note that the cord is being dragged over the ground at the brow of the hill. Right, the shock cord ring on the glider nose should be light weight so as to break off under excessive strain.

THE silk covering of the cord should receive the same care as a pair of expensive silk stockings. Never drag the glider over the cord, and do not drag the cord itself over the ground. A garden hose reel is an excellent implement for winding up the cord and holding it while it is being carried from one point to another.

It is not a good plan to pull the cord over the brow of a hill when launching a motorless plane. Start from the level ground back of the hill, so the crew will not run down grade. Then the cord will not be damaged by being drawn over rocks and sand at the summit, and danger of its snapping back and striking the rearmost members of the launching crew, when it is released from the glider nose hook, will be minimized.

Careful preparation of the cord before it is used will reduce mishaps, Ellis declares.

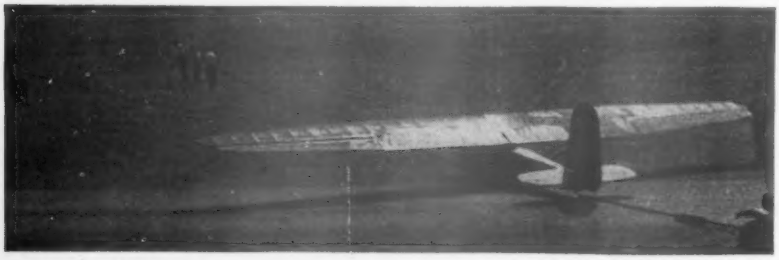
"The center of the cord," he says, "should be fitted with a thimble and a ring for attaching to the nose hook of the glider. The cord should be fastened tightly around the thimble and then taped and wound with twine or clamped; but never under tension. If tension is applied when winding, it will hasten deterioration at that point.

"The ring should be light so that it will not injure persons whom it may hit, and so that it will break before the cord in case of excessive pull, permitting the cord to snap harmlessly between the launching groups. It is best to attach a length of rope, with five hand loops, to each end of the shock cord. Any exposed end of the cord must be taped to prevent unraveling.

"Care should be taken," Ellis continues, "that the glider nose hook is such that the cord will drop off easily. Hooks equipped with hand releases must not be used with shock cord because the tendency of the pilot usually is to release the cord too soon, permitting the ring and thimble to snap downward, perhaps injuring someone seriously."

A SHOCK absorber cord will last longer if kept in a damp cellar than if draped over some portion of the glider while it is stored near the roof or a hangar.

Heat, sunlight and oil are enemies of rubber, and should be kept away from the cord as much as possible. A half day of lying in the hot sun will completely ruin the best new cord made.



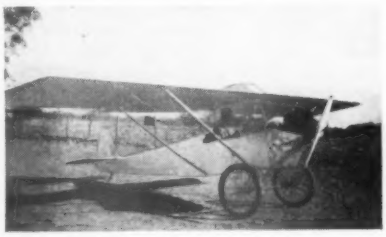
Never more than five men should be on each section of the shock cord. Note the automatic release box behind the tail.

Inspect the cord frequently for broken jacket threads, and tie off any found. If both jackets break through, exposing the rubber, tie a knot in the cord at this point and then provide a rope detour for the stress around the knot. Broken rubber threads are indicated by transverse ridges in the cord. Such places, when found, should be tied out immediately. Usually, however, the rubber outwears the silk jacket.

If you desire to get more pull than was built into the shock cord you are using, double the strands, rather than try to stretch the cord dangerously beyond its limit.

In purchasing a launching rope, it is safer and more economical in the long run to obtain only new Army and Navy Inspection cord direct from the manufacturer, from the glider maker, or from an airplane supply house handling reliable materials.

Novice Builds Heath Plane With Motorcycle Wheels



KELLEY McLEAN sends us a picture of a lightplane which was built by Mr. J. H. Dunagan of Menard, Texas.

This plane was built by Mr. Dunagan in his own garage with ordinary tools, and was built in accordance with the Heath blueprints. It is powered with the Henderson four-cylinder motorcycle engine, which develops 27 horsepower.

Mr. Dunagan has seen fit to equip his plane with motorcycle wheels which, you will notice by the picture, are higher than regular wheels, and which will enable him to land in high weeds and tall grain, and on rough terrain. The propeller was also made by Mr. Dunagan and seems to be as efficient as any other. This little ship is finished in the aluminum finish, and attracts much notice from motorists on the nearby highway.

It is interesting to know that Dunagan built and flew his ship without any previous experience in flying.

POPULAR AVIATION *will be very glad to forward letters to airplane and accessory manufacturers. If you see a new model announced in this issue, and want further particulars, send your request care of* POPULAR AVIATION, *608 S. Dearborn St., Chicago, Ill.*

Pilot Makes Forced Landing; Held for Manslaughter

NO MATTER how good the pilot, he can always get lost in a heavy snow storm and have to make a "forced landing."

But to make a forced landing in a heavy snow storm, then have it followed up by a manslaughter charge—that is something entirely different! And Robert Ray, Colorado Springs pilot, and world war flyer, perhaps holds a unique record because of it.

Flying toward the Pacific Coast on a business trip, Ray was caught in a violent snow storm in New Mexico. The open cockpit ship was far from comfortable, the snow became blinding, and at last he thought it best to make a landing, until the skies cleared. Circling down through the gray clouds, he brought the ship to rest in a field, among a large herd of horses.

At a little distance he could see a cabin, which he thought would serve as a refuge from the falling snow. His hand shut off the motor, which was causing excitement in the herd of horses, and as he did so he saw a figure leave the cabin's shelter and come running and stumbling through the snow.

"It was evidently a cowpuncher, keeping watch over the horses. He came galloping up to see what all the excitement was, and what that huge thing was that dropped from the skies among them with such a noise. We may have looked like a huge bird coming suddenly out of the leaden sky, ready to pounce on the horses. But evidently that cowpuncher had never seen a plane before," went on Mr. Ray.

"The snow was piling up, but straight on this man came, and on the run. Straight to the side of the cockpit he came. He looked over, as if to say something, then dropped by the side. Dead!" Through the swirling snow others followed—and Robert Ray was arrested.

"I learned that I had come down just outside of the town of Las Vegas, New Mexico. The townspeople accused me of causing the death of the cowpuncher. I was held there for three days while an examination was made, then it was officially decided that I was innocent.

"The excitement of seeing the plane, or over-exertion from plowing through the snow was what stopped his heart from beating."

Proposed Ship Will Be Fastest Transport Ever Built

A SPEED of 172 m.p.h. is claimed for a new all-metal, tri-motored cabin monoplane recently designed by Dr. Felix Nagel, noted German aeronautical engineer. Plans are now under way for the construction and marketing of these planes in this country.

Preliminary tests with a model in the wind tunnel of the New York University indicate that the craft will attain a maximum speed of 172 miles an hour under full load, making it the fastest air transport ever constructed.

The high speed of the plane is due to a careful streamlining of all parts. The two outboard motors are faired into the wings on either side of the fuselage and in this respect the model greatly resembles the Lockhead Sirius planes frequently flown by Colonel Charles A. Lindbergh and noted for their high speed.

Power is supplied by three Pratt and Whitney air-cooled engines, two Wasps and one Hornet. The latter is centered in the nose of the plane and the craft has been so designed that if the two Wasps of 420 horsepower each are stopped in the air, the larger Hornet, of 500 horsepower, is of sufficient strength to maintain flight.

According to the plans, the length of the Nagel plane will be fifty-three feet from nose to rudder. The wing spread is eighty-three feet. Under normal load the plane will weigh 1,430 pounds. The cabin is twenty-five feet long, six feet wide and eight and a quarter feet high.

Unlike other transport planes, the baggage compartment has been placed

in the nose of the ship, just to the rear of the Hornet motor. This has been so designed to maintain the center of gravity at nearly the same point whether the ship is loaded or empty.

Aeronautical experts agree and experience has shown that a large proportion of engine failures in the air could be eliminated if the motors and their accessories could be reached and repaired during flight. This experience has been taken into consideration in the construction of the Nagel plane.

The framework in the forward part of the fuselage has been so designed that every important part of the Hornet motor is accessible, as the engine is so constructed that all carburetors, magnetos, fuel lines and oil pumps are located in the rear, easily reached by the mechanic while the plane is aloft. By means of special tunnels through each of the wings, about two and a half feet square, the mechanic can reach the Wasp motors.

Behind the pilots there is a roomy cabin, luxuriously fitted, for twelve or fourteen passengers. A number of planes will be constructed without passenger accommodations, the space thus saved being used for baggage and freight.

Rockets Will Be Used to Launch Glider

THE use of rockets as an adjunct for small planes and as a means of launching gliders is the present aim of Malcolm Pope, outboard speed champion and designer of the world's first rocket hydroplane.

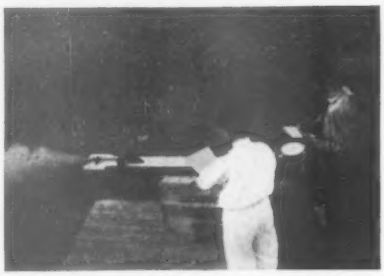
"One of the most practical uses to which rockets may be put," said Pope, in an exclusive interview with Doc Schnurmacher, representing POPULAR AVIATION, "is that of launching airplanes and gliders in a limited space."

"Powerful rockets in the wings, supplementing the motors, would drive a plane almost vertically into the air, enabling them to gain altitude without the necessity of taking off on a long runway in a cleared area."

"This would be invaluable in great centers, where, for example, much time is wasted taking on mail."

Experimenting with Malcolm Pope is his brother, Richard, and the Popes have sought the advice of Professor Goddard of Clark University, Worcester, Mass., famous specialist in rocket propulsion. Professor Goddard is the inventor of a liquid rocket which is said to be a great deal more powerful than the powder variety.

During the next several weeks, it is the intention of the Pope brothers to convert a Peel glider for launching with rockets instead of the boat method which has been used heretofore.



Malcolm Pope (left), outboard speed champion and Dick Pope experimenting with the rockets.

They also intend to equip a small monoplane with rockets as a "life preserver." After a careful survey of airplane crash statistics during the past year, Malcolm has reached the conclusion that many of the crashes that occur are due to engine failure shortly after the takeoff, or other accidents at an altitude of only a few hundred feet where parachutes could not be used.

In tests made with individual rockets, Pope has conclusively shown that, by equipping an airplane with his rocket "life-savers," which are attached to the fuselage and wired electrically, an additional factor of safety is obtained which, in the event of motor failure at a low altitude, will launch the plane above the danger zone.

Results of the Elmira Soaring Contest

THE first real glider contest held in the United States from September 21 to October 5 was a tremendous success. It was held under the auspices of the National Glider Association and not only drew pilots from all over the United States but from Germany as well.

The Duration Flights were won by Albert Hastings of Los Angeles, California. He stayed aloft 7 hours, 43 minutes, 11 seconds. Hastings received a first prize of $250. A close second was won by Warren Eaton, Norwich, N. Y., whose time in the air was 7 hours, 21 minutes, 38 seconds. He received a prize of $175.

In the distance flight contest, Wolf Hirth, the famous German glider pilot, showed his skill by gliding 33 miles from his point of take off, an unofficial American record. He did not, however, technically win the first prize in this event, since the rules laid down by the donor of this prize specified that all awards were to go to Americans.

This technicality made A. C. Haller of Pittsburgh, Pa., the winner of first prize. He flew 21.1 miles and received $250 in prize money. Jack O'Meara of Akron, Ohio, won the second prize of $175 by making a 10.43-mile flight.

The spot landing contest was won by Wallace Franklin of Ypsilanti, Mich., who made a nearly perfect record by landing his glider only 3 inches from the mark. This won him $75 prize money. Wallace Backus of New York City, won a very close second by landing only 5 inches away. He won $50.

Above, Albert Hastings (left) won the duration flight; Jack O'Meara placed second in distance flight. Below, Hirth's sailplane which made an unofficial American distance record of 33 miles.

These records, although they may not be world records, are very excellent, and will certainly be something to aim at, at future glider meets. One thing it shows is that America is rapidly coming to the front in gliding.

Why English Engines Seem More Efficient

READERS of English aeronautical magazines are frequently astonished at the apparent greater fuel economy of English aviation engines. The mileages per gallon show up very high, and the reader naturally wonders what is the matter with American engine constructors and why they cannot show equally as good results. The English figures, when based upon the gallon of gasoline, consistently show about 20 per cent less fuel, but this need not disturb your patriotic ideas for the reason does not lie with the engine at all but the difference in the units of measurement.

The U. S. gallon is smaller than the British Imperial gallon, and therefore the British gallon contains more gasoline than the U. S. unit measure. Referring to your old school arithmetic you will find that the standard U. S. gallon contains 231 cubic inches. Turning over the page, you will also find that the British Imperial gallon contains 277 cubic inches, or almost exactly 20 per cent more volume.

It is therefore obvious that a gallon that contains more gasoline may be expected to show better results than a shorter gallon, without even going into the problem of engine design at all. To reduce the results of British tests into terms of our own gallon, we must therefore reduce the mileage by 20 per cent to get a true comparison. A British test indicating 15 miles per Imperial gallon works out at 12 miles per U. S. gallon so that this may not be so marvelous after all.

However, if the terms are given in terms of weight, that is, as miles per pound or horsepower per pound of gasoline, then matters are almost directly comparable, for the English and the U. S. pound are practically identical. If the consumption of fuel is give in terms of metric measure, we must again make an allowance, for the metric horsepower is a larger unit than either the American or British horsepower.

Airplane Carries Advertising Trailer

AN UNUSUAL form of air advertising has been evolved by the Bleriot company of France. It consists of trailing a banner, 20 feet deep by 120 feet long, behind a plane. A single word advertising a French seaside resort could be read plainly from all points of a circle, about 8 miles in diameter, which the plane made at a height of some 3,000 feet.

When the plane took off, the banner, bound up close to its staff with paper, was carried in special supports under the lower wing with a rip cord running from it to a lever in the cockpit. At about 1,000 feet, this bundle was released, and about 300 yards of cord were paid out before it was ripped open and the advertisement floated clear.

Practical Lessons in Flying

By JOHN B. RATHBUN

Tricks in Landing

AFTER their experiments with flipper turns, Bob and the pilot-instructor Ed sought the shade of the hangar for their mid-day lunch. However, eating did not entirely interfere with instruction so that the story of left-hand turns continued spasmodically, alternated with bites at a sandwich and an occasional good pull at the coffee in Ed's Thermos flask.

This was "ground instruction" in the strictest sense of the word, for Ed sketched out the various diagrams in the sand patch at his right, while the tale of engine reaction and gyrostatic reaction went on.

"In the first place," said Ed, "when the engine is running, the propeller and crankshaft turn in one direction, while the effort or 'counter torque' tends to turn the ship in the opposite direction.

"The counter torque therefore makes it more difficult to turn left than right, and, although most of the torque is compensated for by giving one wing more incidence than the other, yet it cannot be entirely eliminated because the engine torque is variable at different speeds. Running at full throttle, the torque is heavier than when idling, hence it is impossible for one wing adjustment to take care of all conditions in flight.

"Now there is something else that acts at the same time as the torque, and that is the 'gyroscopic couple' that is set up by the rapidly revolving propeller. This gyroscopic force tends to oppose any sudden change in position, hence when the ship is turned to the left, the gyroscopic force tends to raise the nose and to lose speed. A right-hand turn tends to depress the nose and increase the speed.

"The force set up by the gyroscopic action is at right angle to the change in direction and is a really important factor, although it is generally ignored at the present time. Thus, when you snap her quickly into a dive, there is a pronounced effort acting to swing the ship to the left."

"Well, we had better get off the lecture platform and get to work again," exclaimed the pilot; "we have talked about the evils of side-slips and skids, but have said nothing about their virtues and applications—at least so far. Slipping, and sometimes skidding, come in pretty handy sometimes in making landings in small fields, always providing that we know how to manage them and do not allow them to manage us. We learned this pretty thoroughly during the war when it was sometimes necessary to land on a spot about as big as a dime.

"In cases where you wish to lose a lot of altitude quickly for a landing, there is nothing like a side-slip. Just turn her up on her side and let her slide down without any assistance from her wings. This is just one way of getting home quickly, providing that you keep her from going into a spin at the same time. When side slipping, the ship loses altitude without moving forward very fast. Watch this and see if I am right."

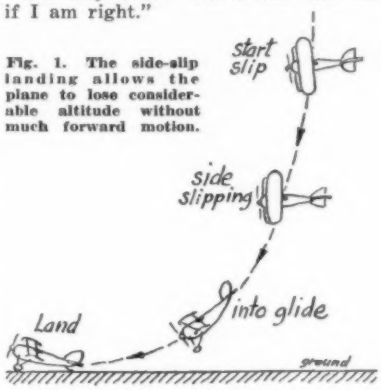


Fig. 1. The side-slip landing allows the plane to lose considerable altitude without much forward motion.

Over the ship went on her side at about 2,000 feet, and then the altimeter needle starting chasing backward over the dial toward the zero point. It was very apparent, also, that the ground was rushing up to meet them, but a trial on the stick showed that the controls were near the stalling point—all except the rudder-bar. The wind fairly whistled past his face on the left side, but little came over the front.

With the altimeter at about 200 feet, she was put into a glide, straightened out, and made an excellent landing. Had a flat landing been made in the usual manner it would have taken a considerable time, or if time had been conserved by making a sharp dive, their speed would have been so great that they probably would have overshot the small field altogether. As it was, they rolled only a short distance and yet had come down through 2,000 feet in an exceedingly short space of time.

In wartime, a ship hotly pursued by the enemy could get into a small field quickly without much rolling by side-slipping, and this was a highly popular method at times.

"THERE is still another method of performing a quick landing without excessive ground speed," explained Ed. "This is by that wonderful process known as 'fish-tailing,' which has been praised and condemned so many times that I tell you frankly that I don't know whether it is still stylish or not.

"To save time you first make a steep dive to the field, and to kill the speed after the dive so that you can get in between the two fences, you swish the tail back and forth and wiggle down to the ground at a moderate speed.

"You see, the continual wiggling causes speed loss by skidding and turning so that we quickly get down to normal landing from a diving speed of 200 or more miles per hour. If you want to lose speed quickly, just wiggle the rudder back and forth."

Fig. 1 shows a side-slip landing clearly, sliding down sidewise without much forward motion until a short distance above the ground and then starting into a normal glide until landed. From the time that the slip starts until it has ended, the ship has lost a great amount of altitude and yet has moved only a short distance forward. The landing speed is low, much lower than would be the case with a dive, and the ship rolls only a short distance.

A fish-tail landing is illustrated by Fig. 2, a steep dive to lose altitude, straightening out after the dive, and then follows the loss of speed by "fish-tailing" or wiggling the ship back and forth until landed. Both the side-slip and fish-tailing methods are successful and much used. However, it is often stated that there is more danger of overshooting the field when fish-tailing than when getting in on a side-slip, but as there are counter-arguments to this effect we will not attempt to settle the dispute here.

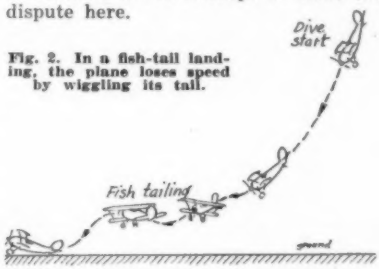


Fig. 2. In a fish-tail landing, the plane loses speed by wiggling its tail.

"Suppose you now try a few glides yourself," announced Ed, "leveling off about 50 feet above the ground. The main thing to observe in this case is to keep your flying speed above the stalling point and to avoid killing the engine altogether when it is well throttled down. This may look simple, but it has been responsible for almost numberless crashes in the past and requires your careful attention.

"Throttle down to 200 R.P.M. and I will leave the rest to you," continued the headphones. "We are high enough so that we will have time for our prayers before the big bump, no matter what you do. All right—all right, throttle her down—have you got cold feet?"

Down went the engine R.P.M. to idling speed, and, almost instinctively,

Bob moved the stick forward into a dive so as to maintain the speed.

Bob looked at the air-speed indicator and saw the hand pass rapidly over the dial from 70 M.P.H. to 90 and then to 115 M.P.H. He pulled back slightly on the stick, the nose came up and the speed fell off even more rapidly until it was down to about 45 M.P.H.

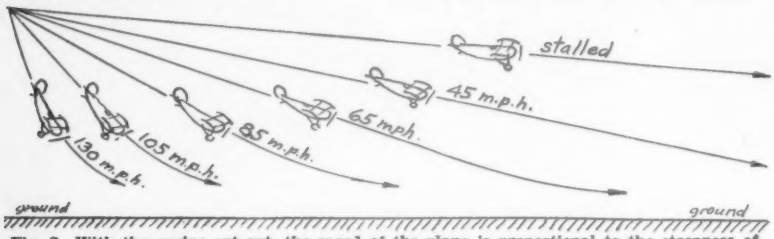


Fig. 3. With the engine cut out, the speed of the plane is proportional to the steepness of the gliding angle.

It seemed strangely quiet and he soon missed the guidance of the engine exhaust which was a comfort and a reliance in his other maneuvers. Then forward went the stick again, and, with a big burst of speed, the hand walked right over to the 130 M.P.H. mark on the dial, while the whistling stays checked up on the severity of the dive.

"We'll be right down quick, Mary," quoth Ed; "get the lilies ready for this boob before he blows the wings off altogether. For the love of Mike, pull back on that stick unless you want to go through those buildings over there."

Bob was ready with the stick and back it came. Up went the nose way over the horizon and down went the speed nearly to the stalling point. "Now put her in neutral if you can remember where neutral is," said Ed, "and give her the gun until we get back where we started from. We're getting too close to the rocks to suit me."

"Now listen, son, just climb this crate up to the 1,500 mark and try to glide down at a respectable gliding speed. Just imagine for a moment that our engine has gone blooey or that something else has happened, so that we are trying to get along as far as we can to a better landing place. Stretch out the glide as long as you can, but don't get her down to the stalling speed."

"Get the habit of using the horizon as your guide in gliding, always checking up the results from time to time by the air-speed indicator—if you have one. Pretty soon you will find that you can glide and glide at a low speed by noting just how far her nose points down. With the engine cut out, the speed is proportional to the steepness of the gliding angle (Fig. 3), the steeper the angle the greater will be the speed; the flatter the angle the lower will be the speed."

BOB flattened her out after he got to the elevation demanded by Ed, and with the stick slightly in advance of the neutral position, the ship floated along at about 45 M.P.H., the nose slightly below the horizon.

Once in a while she would hit an upcomer and the nose would lift, requiring work with the stick to bring her down, and then the reverse would happen. However, she was kept on a fairly uniform glide without much variation in speed until they got to about 100 feet above the ground.

"Give her the gun again, and try it over. That was a swell flat glide, believe me," said Ed.

Back she went to 1,500 feet and the trial was repeated, always climbing gently and well within the limits of the engine, except one time when Bob got a little too ambitious and nosed her up until the engine groaned with the burden. Ed more or less assisted in the climbing, making an occasional correction, but on the whole, Bob did most of the work.

"All right. Now see if you can hit that mark over there, that big brown patch of dirt to the right of the field. I don't mean that you should actually hit it, but see if your unfailing skill and accurate eyesight can bring you about 50 to 100 feet above the patch at the end of the glide. This calls for judgment and is the first lesson preliminary to making a landing."

So far as Bob could judge, the brown patch referred to seemed about a mile away, and he moved the stick forward until the ship pointed directly at the patch. Up came the speed suddenly, until they were traveling about 110 M.P.H., but Bob held her steadily on the course to the best of his ability, while the pilot remained silent. When they got to the brown patch they were a full 500 feet above it, and then came one word from the pilot, "Overshot."

Pilot Discovers Fire and Summons Firemen

IN INGOMAR, near Pittsburgh, Pa., a group of firemen lounged around their station house and enjoyed an afternoon of leisure. Suddenly there came an interruption. A plane was swooping low, almost over their heads. The men came to their feet. Something seemed to be the matter with the pilot. He was flying perilously low, almost touching the roof tops.

The men watched the plane drop almost over the street, and then the motor was shut off for an instant. The pilot leaned over and gesticulated frantically to them. The firemen could understand nothing. The motor suddenly snapped on again and the plane flew on.

It came back in a few moments and went through the same motions. This time, with motionless breaths, they heard the pilot, George Dickson of Pittsburgh, say as the motor was hushed:

"Fire! Wildwood! Follow me!"

P. A. Brunn, Jr., assistant chief of the volunteer company, his brother, Louis Brunn, driver of the combination chemical and hose truck, and the rest

(*Continued on page* 53)

13 Year Old Boy Solos

BEN T. EPPS, JR., thirteen years old, is shown in his plane at his father's air school at Athens, Ga. Ben is now a qualified pilot, having made his first solo flight three months ago, and is now making them regularly. He is said to be the state's youngest pilot. No wonder!

His father, Ben Epps, Sr., was Georgia's first air pilot.

Airport Siren Signals Planes

MANY of our readers who hang around airports have frequently heard the shrill of the airport siren.

The accompanying photo shows a siren at the Oakland Airport which sounds one blast for the arrival of a mail ship. Two blasts indicates that the field is clear when any ship may take off. The photo also shows the rotary beacon mounted just above the siren.

Japanese Makes Record Distance Flight

AMERICA does not have a monopoly on serviceable lightplanes. Here we see a little Junkers which just flew to Tokyo, Japan, from Berlin, Germany.

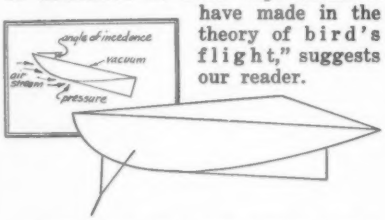
Seiji Yoshihara is sitting in the cockpit of his plane just after establishing a new light airplane record. Yoshihara covered 6,782 miles in 10 days, or an average of 678 miles a day. This beats the record formerly held by Bert Hinkler who flew from England to Australia in 1926 at an average speed of 531 miles a day.

Yoshihara is also the first Japanese solo flyer to cross Siberia.

Reader Offers His Ideas on Bird Flight

ARTHUR BILLINGS is an observant young man and has been studying the principle of "bird-flight." His letter to the editor of POPULAR AVIATION is well worth reading.

"Perhaps you and your readers would be interested in some experiments I have made in the theory of bird's flight," suggests our reader.



"Some time ago I was employed in a factory where some of the men placed corn on the window-sills for a flock of pigeons. I became interested in watching the birds fly from window to window.

"It was puzzling to me how these birds could fly so gracefully and with such apparent ease. Soon I began to evolve a few theories and worked on a few practical experiments.

"In the first place, the flapping wing has given me the theorem that the wing, when in motion, cannot be considered a part of the bird's sustaining power. It is only a mechanical means of maintaining a wind stream flowing backwards from the bill of the bird towards and past its tail.

"With the wings eliminated, the bird is revealed as a triangular shaped body, flat on top. On the bottom is seen a tapered round shape, starting at the bill and broadening and deepening to the point of the breast. The body then recedes to a thin edge at the tail.

To prove and experiment with my little theories I decided to build a kite along the lines of a bird's body, devoid of wings. A few small sticks of pine and paper provided the materials, and soon I had a kite shaped as illustrated.

"I took my kite out in a moderate wind and I was astonished at the way it rose in the air. I wondered where it got its sustaining power. A careful study explained the mystery—and the accompanying diagram reveals why both the kite and the bird fly so well."

Court Decision Saves $50,000

MERELY being in an airplane while it is in the air, for insurance purposes at least, does not constitute "engaging in aviation," according to a decision of the Florida Supreme Court.

The decision was in the case of Dorothy Y. Price against the Prudential Insurance Company of America seeking an additional accidental death benefit on account of the fatal accident to her husband, John W. Price, near Jacksonville.

According to the file in the case Mr. Price carried a life insurance policy with the defendant company in the sum of $50,000 which carried an additional $50,000 benefit in event of death by "external, violent and accidental means." The policy, however, stipulated that the additional coverage did not apply to those, among others, "engaged in aviation."

Prompt payment was made of the face value of the policy, it is stated, following an airplane crash and fire in which Mr. Price lost his life. But the company denied liability for the additional benefit on the ground that the insured, at the time of his death, was engaged in the excepted occupation of aviation. In the original hearing of the case before the circuit court for Duval county, Florida, a demurrer was sustained and judgment entered for the insurer.

On appeal the plaintiff, widow of the insured, urged first that inasmuch as the exception was worded, "from having been engaged in aviation or submarine operations or in military or naval service in time of war," that the intent of the insurer was to except only those "engaged in aviation * * * in time of war." This, however, the Supreme Court overruled, holding that the phrase "in time of war" could not logically be applied to the more remote phrase, even though no punctuation marks had intervened.

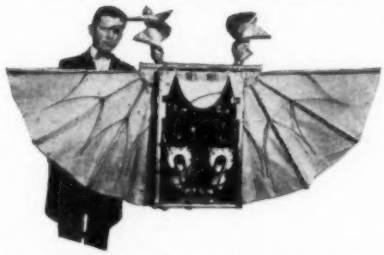
The second contention of the widow, however, was upheld—that mere occupancy of an airplane, even though it were flying, did not constitute "engagement in aviation."

"Being engaged in aviation operations," the opinion of the court held, "means taking part in the operations of an airplane in some direct way other than merely participating in aeronautics by being in an airplane while it is in the air."

The case was reversed and sent back to the trial court for "appropriate proceedings."

The opinion is being regarded here as a "landmark decision" in being the first to hold that being a passenger in an airplane does not constitute engagement in aviation.

Individual Flying Machine



AN INDIVIDUAL flying apparatus has been invented by a Viennese mechanic, Anton Lutsch. A Swiss company is backing him in his experiments, so that he has considerable capital at his command.

His improved machine is provided with special screws of his own invention. These, together with a motor, can be fastened to the man's body.

His first apparatus was built with primitive machines, but he is said to have succeeded in flying with it. This machine weighs 80 pounds in all, but the inventor hopes to reduce the weight to 60 pounds. It is estimated that the cost will be from $80 to $100.

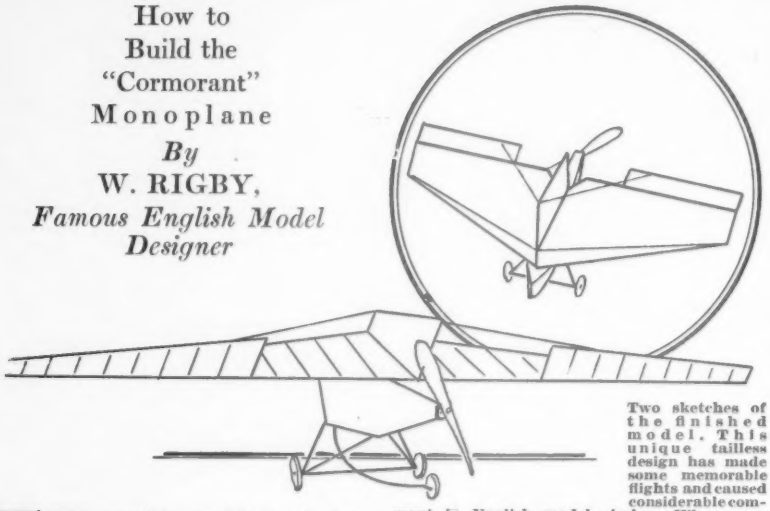
New Sport Discovered

A NEW sport was inaugurated at the Air Races, in the form of a "rescue" race. The planes took off from the airport and splashed into a beach several miles away. There they rescued dummies that were floating around the lake and brought them back to the airport. Left to right: Winners in the race, Art Caperton and Lou Gordon.

MODEL DEPARTMENT

How to Build the "Cormorant" Monoplane

By
W. RIGBY,
Famous English Model Designer



Two sketches of the finished model. This unique tailless design has made some memorable flights and caused considerable comment in English model circles. When completed, this model can be used for experimental rocket purposes.

THIS month's model is of that unique type, the "Pterodactyl," or tailless monoplane; it has a wing span of 42 inches, an overall length of 14½ inches, and is a most excellent flying and gliding model. Covered with oiled silk it can be either doped or left in its natural color, according to the taste of the constructor. The motor is detachable, a great improvement over the old fixed motor types, both from constructional and repairing points of view.

The model is built from ¼-in. by 1/16-in. strip wood, with joints of the usual types, parcel taped, glued or lashed, according to requirements. This can be safely left to the judgment of the model maker, bearing in mind that strength in jointing adds to the total strength of the structure with very little additional weight, so, when in doubt, joint in the strongest manner, leaving nothing to chance.

Study your working diagrams well and then cut strip wood to the following dimensions:

Wing.—Main front spars: two 23 in. Front supporting spar: one 44 in. Rear supporting spar: one 42½ in. Rear (trailing edge) spars: two 20¼ in. Bracings: two 11½ in., two 10¾ in., two 9 in., two 8½ in., two 6½ in., two 6 in., two 4 in. Diagonal bracing spars: two 15½ in. Brace to front supporting spar: one 11½ in.

Stabilizer.—Support: one 9 in. Post: one 3 in.

Ailerons.—Two 12½ in., two 12¼ in. Bracings: two 1¾ in., two 1½ in., two 1 in.

Fuselage.—Side spars: four 14 in. Bottom spar: one 14½ in. Spar for prow: one 1½ in. Sternposts: two 1½ in.

Undercarriage.—One 9½ in. (see Fig. 7); one trailer, 7 in.; one axle (round cane), 5 in., two 6 in.

THE wing should be built first. Cut from stout cardboard (⅛ in.) two key sections "A." Join these at narrow end firmly with twine and force open at broad end to a width of two and a half inches (see Fig. 4). Now take the complete 44 in. length of strip wood to be used for the front supporting spar and carefully bend exactly in center until it gives but does not entirely break apart. This should be firmly inserted on edge at the extreme top of the cardboard sections in the slots provided and, in place, should spread out without its ends drooping toward the bench.

This spar carries out the important function of supporting the entire wing area with the least possible droop to wing tips, and should, therefore, be very firmly attached to the sections. Next take the brace to this spar and fit into slots provided at rear of supporting spar (see Fig. 4), binding the ends very strongly to the supporting spar, helping the former in its heavy task.

The main front spars should now be joined firmly and accurately in the requisite swept back position and fixed to the extreme front of sections "A" in the two bottom slots. Take the short stabilizer support and fix it firmly in between the two sections, notch one end so that it fits over the inner edge of the front spar apex, glue in place and lash the rear end to the already lashed ends of sections "A." In this spar, very carefully indeed, make an opening which will subsequently accommodate the sharpened chisel point of the stabilizer upright dealt with later.

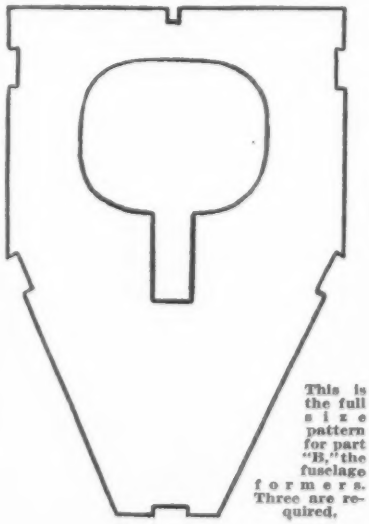
Insert rear supporting spar at the end of your already assembled center section, seeing that it is dead level and meets both front spars at extreme tips in such a way that no "belly" is caused in it on either side of center section. With the exception of the two end spars, the cross bracing spars of the wings are in duplicate, six going across the bottom of wing spars and six (after being carefully bent) taken over the top of the front supporting spar. All should be strongly lashed to both front and rear (trailing edge) spars as well as the front supporting spar.

The diagonal bracing spars should be fixed from the inside corner of back of each wing to the front edge, catching it between the outside top and bottom cross bracing spars, securing it firmly with glue and lashing. Ailerons should be constructed and fixed to the wing by using two strips of oiled silk, one each to be glued along the top and bottom inside edges of the aileron and against the corresponding trailing edges of each wing.

TO CONSTRUCT the fuselage, cut three sections "B" of stout cardboard and attach the five main fuselage spars so that the three sections are 2 in. apart with the front section set back 2½ in. from the extreme tip of the nose. Draw the four side spars together in pairs, lashing the ends to a 1½-in. upright to form prow, finally bending bottom spar up until it is caught in between the bottom pair of side spars, lashing and glueing securely into position.

Next carefully wind round the prow a length of old motor elastic in such a manner as to form a neat shock absorber. At the rear end introduce two upright pieces of strip wood between the top and bottom side spars and firmly glue in this position.

When glue is quite set, take the two ends and draw them together to form an aperture measuring 1 in. wide at top and ¾ in. at bottom. Treat the bottom spar in the same manner as at the nose, catching it in the binding. An extra binding of glued twine should be taken round the completed motor open-



This is the full size pattern for part "B," the fuselage formers. Three are required.

ing and care taken to see that whilst it is setting the opening remains an even shape as in Fig. 9.

Wing is now firmly lashed on to fuselage, the center spar (Fig. 6) dropping into the small grooves at the top of the three sections "B." Lashing should proceed the entire length of the broad inside edge of the wing and across the rear main wing spar at the well.

The method of fixing the undercarriage is self-explanatory, care being taken to bend the rear main support into the shape shown in Fig. 7, lashing it to the hairpin bend to bottom fuselage spars at a position near the third fuselage section "B."

Trailing wheel is attached in the manner shown and a spring being constructed between the trailing spar and main axle by using stout elastic wound to give tension. This operation should not be performel until the whole machine is entirely constructed and the motor in position, when the spring should be strong enough to hold the whole structure at an angle of 85 deg., that is allowing ample clearance for propeller in motion.

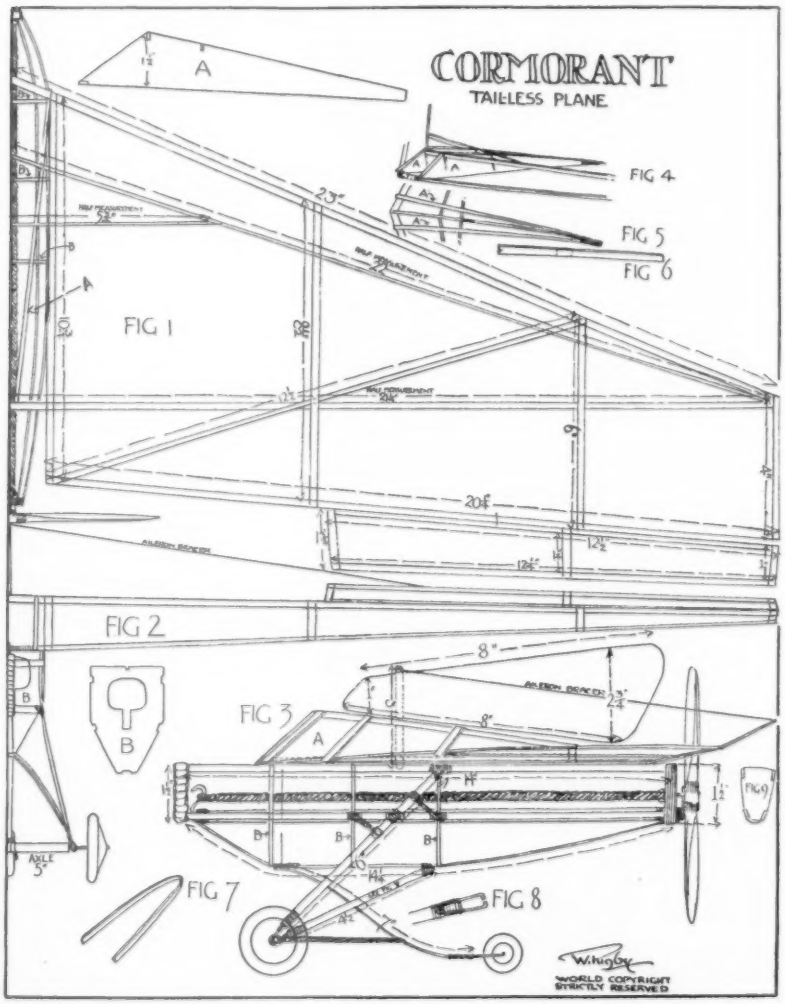
Axle for trailing wheel is made of a stout safety pin cut and bent (see Fig. 8), wheel being sprung into place and the shanks of pin then bent up or down as necessary to keep wheel upright.

Motor beam is of the ordinary type and need not have special lugs on account of its forward drive. As the wind is only short take-off from the ground will only be effected by introducing twin drive, parts for which are easily obtainable at accredited accessory dealers.

The stabilizer—that is, the center upright surface which acts as rudder—is made of medium but strong cardboard—not strawboard—to the size and shape shown and fixed on an upright by inserting and glueing same through the layers of the cardboard, afterwards doping or painting whatever color is desired. This upright should be sharpened to a chisel point and thrust carefully through top of wing and center spar provided for it (see Fig. 6).

Bracing wires or twine should then be fixed to pull ailerons up to an angle of about 25 deg., seeing that both are level with each other, and the center of the bracing passed around the top of stabilizer post as shown.

It is not desirable to fix the stabilizer



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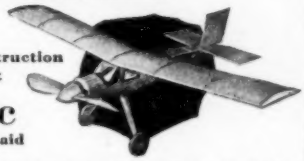

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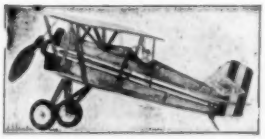

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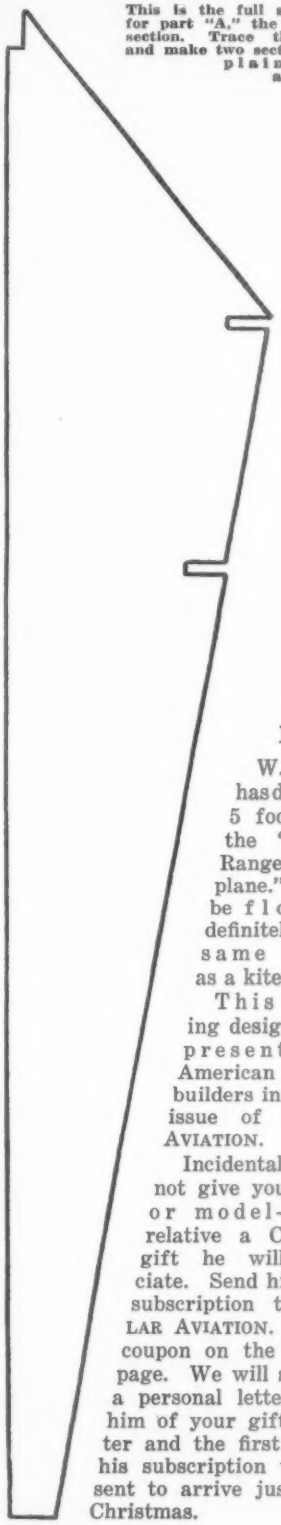
Model Department

(*Continued from preceding page*)

post into the center spar with glue, as this portion of the machine comes in for most of the knocks if the model rolls over in landing. Leaving it loose to be thrown out rather than broken makes it replaceable without stripping the main structure.

Cover with plain or oiled silk according to whether painting is desired or not. The method of covering is the same as that given in preceding articles; the only parts being left uncovered are the bow and stern of the fuselage at the top.



This is the full size pattern for part "A," the center key section. Trace this outline and make two sections as explained in the article.

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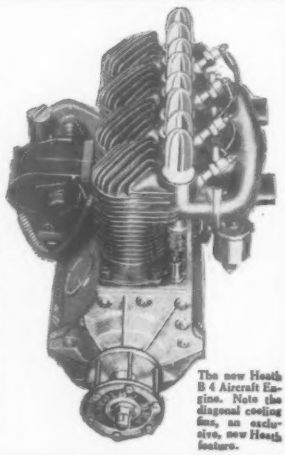

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NOTICE

W. Rigby has designed a 5 foot model, the "Rigby Ranger Sailplane." It can be flown indefinitely on the same principle as a kite.

This interesting design will be presented to American model builders in an early issue of POPULAR AVIATION.

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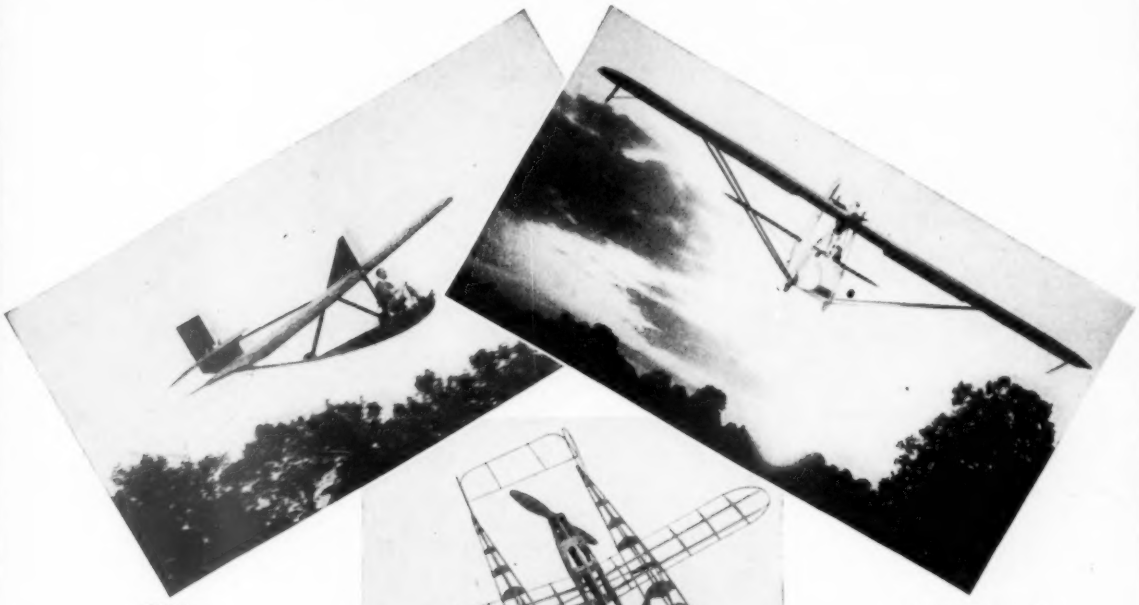

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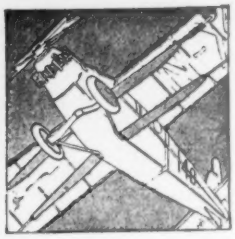

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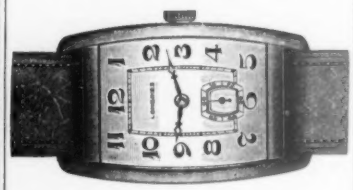

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WOMEN'S ACTIVITIES

EDITED BY **LOUISE THADEN**

IT WAS with extreme regret that we read of Ruth Alexander's death. Tragic as were the circumstances surrounding the fatal accident, the loss of a life such as Miss Alexander's should at least bolster our good judgment to the point of refusing to fly in hazardous weather—to use plain everyday good sense in knowing not only how to fly, but when to fly. Because the weather is rotten and we refuse to take off does not show any signs of yellowness; none of us is afraid of death, but why rush the inevitable, when life is more or less sweet?

Louise Thaden

* * *

Mrs. C. E. Money of Vancouver was elected president of the Women's Aeronautical Association of Canada at the organization meeting recently held in that city.

* * *

Mrs. Clifford Ball, wife of the operator of the air mail from Pittsburgh, Pa., to Cleveland, Ohio, and an air passenger line from Pittsburgh to Washington, D. C., has won a private pilot's license. She flies from Bettis Field, Pittsburgh.

* * *

The list of women transport pilots is growing; the most recent additions to the ranks of those who have "arrived" are Alberta Worley of Oklahoma City, Ruth Barron of Hollywood, Calif., and Ruth Haviland Seitz of Kansas City. It will be remembered that Ruth Haviland was the first airport hostess in this country, being in charge at Fairfax Airport, Kansas City, Kansas.

* * *

Mrs. Alexander De Seversky, wife of the Polish war ace and aeronautical engineer, is now a licensed pilot. Mrs. De Seversky is a member of the Long Island Aviation Country Club, and learned to fly there.

* * *

We trust Mrs. Lindbergh will soon join the ranks of licensed pilots.

* * *

Barbara Hawley, aviation editor of the Erie, Pa., Dispatch-Herald, earned money for her private license by writing a running account of her experiences while learning to fly. She expects to have her limited commercial shortly. Her husband also flies.

* * *

Katherine Rogers of Warren, Pa., and Ethel Anderson of Pittsburgh now have L. C. and private licenses. Miss Anderson obtained her license through a scholarship offered by the Women's Advertising Club of Pittsburgh. She is a graduate of the University of Pittsburgh, and plans on going into commercial aviation.

* * *

There are now 311 licensed women pilots in this country, 240 private pilots, 41 limited commercial, 2 industrial, and 28 transports.

* * *

I was much intrigued by an editorial which appeared in the New York Herald-Tribune, as follows: "Not the least gratifying feature of the woman's air derby is the fact that the winner and her closest competitor are mothers. . . . But there is encouragement here for the counter proposition that all women fliers should become mothers and thus help to make the race air-minded." We women pilots seem to have our work cut out for us.

* * *

My young son Bill was presented his first cup by the Aero Club of Pittsburgh at a club luncheon recently. Bill had a date with the nurse, so Herb and I accepted the cup for him.

* * *

Mrs. Victor Bruce has taken off from London, England, in a Bluebird sport biplane for an unannounced destination. Although the flight is veiled in secrecy, it is rumored she is attempting a round-the-world air trip.

* * *

Even good pilots turn over now and then, Amelia—we are sorry.

* * *

Mrs. Keith Miller, participant in the 1929 women's derby, test pilot, and airplane salesman, has purchased an Alexander Eaglerock Bullet, which she has ferried to New York City. The ship is equipped with extra gasoline tanks and powered with a J-6 "5."

* * *

Gladys O'Donnell, tall, fair, and blonde, started in to learn to fly in December of 1928, at Long Beach, California—because her husband had the "bug." In August of 1929, eight months later, she stepped out and nonchalantly took second place in the heavy division of the women's derby. Not satisfied to be a runner-up, she came back and as nonchalantly captured first place in the 1930 derby, maintaining an average speed of 160 m.p.h. She has had only 300 hours solo.

Born at Whittier, California, on March 2, 1904, graduating from the Santa Paula high school much later, she attended the Otis Art Institute, and shortly afterward married Lloyd O'Donnell. She is the mother of two children, a boy and a girl, and is the master of any airplane she happens to fly. She holds transport license 6608, is a member of the N. A. A., the National Air Pilots Association, and a governor of the 99's.

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Police baffled to find murderer who shot and killed Bensen in cold blood. Ten acquaintances of Bensen being held. According to Janitor's clew, the mysterious stranger seen leaving Bensen's room was bald. Five of Bensen's friends were found to be bald. Janitor then disclosed that murderer had a mustache. Six of the men have mustaches. Janitor adds that visitor's right ear was missing, that he had a scar on the left cheek and that he wore nose glasses. Three of the suspects were found to have an ear missing, four of them have a scar and three of them wear glasses. The man who committed the crime has all of the characteristics mentioned by the Janitor. Can you find him?

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Crazy Hops with Dumb Students (*Continued from page* 22)

another plane would cause him to veer and head for it as surely as a bulldog might head for a cat up an alley. Nor could he get over the habit. He had to give it up after a while.

"He'd have made a good pilot," said Brayton, "if he could have had the entire sky to himself."

It sometimes happens too, that the student in whom you place a lot of confidence—whom you'd swear would finish with honors—in the end proves to be a wash-out. Such was the case of the locomotive engineer that Brayton once had for a pupil.

The man was quite accustomed to sitting at the controls of a locomotive as it dashed over the rails. His train was a fast one and he was considered one of the best drivers on the road. He never had had an accident and he had the reputation of being cool-headed.

But up in the air he went to pieces. He froze at the controls and no amount of effort by his instructor could change him. He was a wash-out from the beginning, and sadly he packed up and left, to go back to fast driving on the rails.

BRAYTON himself learned to fly while he was a mechanic at Lambert-St. Louis field. It came about in a rather unusual way. A crack automobile salesman named Parks purchased an airplane and made a deal with Brayton.

"You keep the plane in repair, Clyde," said Parks, "and I'll teach you to fly. How's that?"

Brayton said it was good and the agreement was made.

That was in the days when "Slim" Lindbergh was carrying the mail to Chicago, and he, Bud Gurney and Phil Love bunked at Brayton's house on the field. Brayton recalls with a chuckle how Lindy, who was a great practical joker, once had the tables turned on him.

Lindy, tired from a trip, went to take a nap and as the weather was cool he crawled into a sleeping bag. Love crept up on him. Carefully, lest he disturb the sleeping Lindy, Phil sewed him into the bag. Nor did he release Lindy until the long, slim fellow promised to "behave."

Brayton tells of an interesting thing that happened to a young German student. For several weeks the fellow had experienced difficulty in landing. He habitually would bring the plane down sharply and nose it into the ground.

For some time Brayton could not discover the cause and no amount of thought or investigation could lead him to the explanation. Then one day an idea hit him. He walked over to the student.

"Let's see those goggles of yours, son," he demanded. "Where did you get them?"

The student took them off and gravely handed them to his teacher. Brayton turned them up to the light and squinted through them. He rotated them before his eyes. Then a smile spread over his face and he shook his head, amused and satisfied at last.

"I thought so," he said, turning to the student. "Did you know these goggles distort your vision and make the ground appear twenty feet nearer than it really is? Of course you didn't. But that's why you fly into the ground instead of landing like an aviator and a gentleman. I'll get you a new pair."

Afterwards Brayton explained:

"The boy wanted a new, fancy pair of goggles and bought them without telling us he had done so. No wonder we nearly had to give him up as a student. We have to watch things like that, most carefully. He was all right with another pair that really fitted him."

Although his job sometimes is wearying and often filled with danger, the hardest part of it, Brayton thinks, is to bid his pupils good-by at the close of the course. He takes them when they are new and awkward and beset with fears and patiently brings them through the course.

Then at a time when they begin to act like real flyers and are well along on the road to confidence in themselves and have developed a real love for a plane, the course is over and they leave him, so that he turns once more to the awkward squad and starts training all over again.

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MEAD GLIDERS

Dept. E4 12 S. Market St. Chicago Illinois

An Airy Chat

(*Continued from page* 10)

"It seems to me the pilots were justified this year in their usual 'gripes' for numbers of them came to Chicago with planes which were not eligible to enter anything, except the free-for-alls. After all, what would the National Air Races be without the commercial pilots and the commercial operators? The derbies, with the exception of the non-stop, were pitiful affairs—some of the closed course races were nothing to brag about.

"Last year there were 19 women entered in the derby out of a possible 30 who were eligible. This year there were 12 entries, out of a possible 100 eligible to enter.

"A publicity story was released to the effect that two army pilots and a flight surgeon were to accompany the women's derby. If the same precautions are taken for the men, we don't mind,—what we do object to is being wrapped up in cotton and handled with rubber gloves—in other words, we don't like being 'babied.' We believe that 'what is good for Peter is good for Paul.'

"It is my hope that, since women are taking such an active part in commercial aviation, and are becoming an increasingly important part of the National Air Race program, that the 1931 Race Committee will include a woman among its members."

SEVERAL readers were kind enough to send us pictures and a story on the National Soaring Meet held recently at Elmira, N. Y. This cooperation is much appreciated. We are always glad to receive little bits of news from readers.

And don't forget we pay for all material published.

But what we started out to say was that one contributor sent in a long, fully illustrated story on the Elmira Contest. He forgot to put his name and address on his manuscript. If this particular contributor wants his story back, he had better let us know who he is, and where he hangs out.

POPULAR AVIATION is as anxious as ever to publish radical conceptions of air minded inventors.

For example, C. E. Sutherland of San Francisco is building a ship that will not spin. His idea is that if the motor and other heavy weights be placed within the fuselage, at the center of gravity, everything will be hunky-dory.

As soon as Mr. Sutherland gets his ship built—and *before* he prepares to take off on a test-hop—we hope he sends us a good picture of his ship.

AND just between us, there is a prominent engineer in Chicago, working on a design for a new transport plane. The plane will have no wings, no propellers—but will be sustained and propelled by a wing flapping arrangement. Details and drawings of the model have been promised to us, so perhaps we'll be able to tell you more about it in the next issue. *And it's supposed to do 760 M.P.H.* Watch Mr. Rathbun burn up when he reads that!

NOW we have a surprise for you. You have all heard about various aviation clubs, model clubs, glider clubs, flying clubs. The "99" women's organization; the "Early Birds"; and the "Caterpillar Club."

Well, we now have one more—the "Crack-Up" Club. Headquarters at Box 539, Palatine, Ill.

F. "Speed" Westphal, president of the Windrider Sailplane Co., was the one who wrote us about it. "The Crack-Up Club," writes Mr. Westphal, "is made up of pilots of any type aircraft (airplanes, gliders, balloons). To be eligible for membership, the pilot must have, at some time during his or her flying career, cracked up some part of the ship, such as landing gear, prop., or wing."

Any type of Crack-up will not do. This "Crack-Up" club has stiff requirements. The applicant pilot must have cracked up his ship to such an extent that shop repairs are necessary before the aircraft may again be flown.

At the end of each year, a silver loving cup will be given to the member having the most crack-ups.

My own idea is that the winner of the loving cup won't have much use for it. A lily would be more practical.

JUST one more letter, and we'll sign off until next month.

J. Thomas Laurie, of Ft. Wayne, Ind., writes the following letter:—

"Just got my October issue of POPULAR AVIATION and I have about read it through. That sure was a great story by Dick Grace. I hope you have more like it. The model S.E.5 is sure the berries.

"I wonder if you could tell me how to make a powder compound for a model rocket plane. I am very much interested in rocket planes at the present. I sure have to congratulate you on your wonderful magazine."

I'll tell you what to do, Tom. You build the Rigby Cormorant model, described in this issue. Next month we'll publish the formula of a special gunpowder compound especially compounded for rocket models. You can then experiment on your Cormorant tailless model.

B. G. DAVIS.

Pilot Discovers Fire

(*Continued from page* 44)

sprang immediately into life and trailed the flier to a timber fire at Heart's farm, Wildwood, ten miles away.

Aided by the firemen, the flames were extinguished after a two-hour fight. The conflagration had gained a decided headway, and had not the firemen been summoned when they had, it would have destroyed a valuable run of timber, and also several occupied dwellings.

The War Flyers

(*Continued from page* 15)

hard to do. A lot of fellows never survive their thirtieth birthday, as the life insurance agents may have mentioned. We all know it, yet we all expect to be octogenarians. It's always the other fellow who will get an early summons from St. Peter.

YOU'LL never know the number of fellows whose ability to laugh at tragedy enabled them to see the war through. The fliers laughed at danger—they laughed at death.

Major Douglas Hill commanded a bombing squadron. Seven Fokkers chased him back from a raid one afternoon and shot his machine to ribbons. His observer, sitting directly behind him, was riddled with bullets. Hill headed for the first aerodrome he could find—his companion might still be worth salvaging. A lot of his good friends occupied the field where he landed.

When his plane touched the ground it literally fell apart. The tail surfaces parted company with the fuselage, both tires were flat and one wing drooped alarmingly. He taxied to the hangars dragging the wreckage behind him.

They pulled the observer out, hit in seven places but still very much alive, rushed him off to hospital, and then turned their attention to Hill. They looked at his plane, shattered by a hundred bullets.

They looked at him, white as a ghost and with his eyes sticking out on straws, and burst into uncontrollable laughter. He stuttered when he tried to tell them what happened and they roared till the tears came. The more he stuttered the more they laughed.

Every detail of the harrowing battle, the battle that had nearly been his last, brought new explosions of mirth. The idea of Douglas Hill fleeing for his life from seven deadly Fokkers, his observer unable to protect him, clouds of smoking bullets whizzing by his head, scared pink and positive he would never get home alive, was side-splittingly funny.

They laughed, too, when a comrade at arms hastened home one day shot through that portion of his anatomy commonly known as the seat of the pants. He was listing badly and sitting on his liver, which made it difficult to fly, and he was suffering acutely, but his misfortune was his friends' good fortune—it gave them something to laugh at.

MOST fliers, I think, were fatalists. It was the only doctrine that would hold water. If you embraced it, as many did, it was a great source of consolation. You simply decided your destiny was predetermined and inevitable, and ceased worrying about what might happen to you. When your time came it would come—there was nothing you could do to stop it.

Howard Knotts, who flew in an

(*Continued on page* 64)

A New Lightplane

(*Continued from page 23*)

minute a 30-h.p. motor was installed. On its initial test flight it did everything if not more than its designers had hoped it would do with 60-h.p.

A staff member of POPULAR AVIATION had the privilege of seeing the ship fly a few weeks ago. The motor was hardly warm, it seemed, when the pilot "reved" up the motor wide open to test it, at which time the little plane almost jumped over chuck blocks. After the blocks were pulled away the plane took off in 75 feet to 100 feet. As it flew around the airport it appeared very steady, particularly in view of the choppy air that day.

In a level flight the tail is slightly up so that the fuselage is directly in the line of flight, thus lessening the drag. When the plane landed it used a space in one corner of the airport not over 75 feet long.

With its midwing construction the center of gravity is unusually low. A person weighing 135 lbs. can sit on one wing tip without even causing the other wing to raise. It is said that in a ground loop a tire would be pulled off before either wing would drag. The lightplane will carry a useful load of 150 lbs. in addition to the pilot.

It is planned that this plane will sell for less than $1,000. Specifications showing its size are as follows:

Wing spread—30 ft. 8 in.
Height—5 ft.
Length over all—22½ ft.
Wheel tread—6 ft. 3 in.
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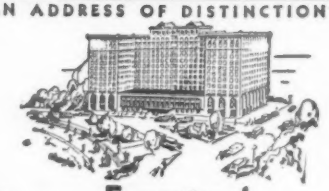

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CLUES The difference in the keys may be in the size, the shape, or even in the notches, so look at each key carefully, and if you can find the one key that is different from all the others, send the number to me by first mail. Do it at once. You may become the winner of a Straight 8 Buick 4-door Sedan fully equipped or $1750.00 cash money, without one cent of cost to you. I will give away five new 4-door Sedans, and the winners can have cash money instead of the automobiles, if they prefer. Twenty big prizes will be given, a total of $7750.00.

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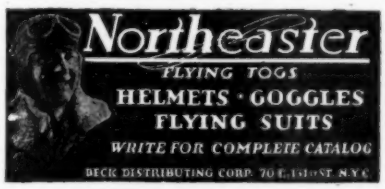

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Name.....*Age*.....

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500 Miles per Hour Can't Be Done

(*Continued from page* 30)

conclusions as Cowley and Levy, but by analytical means instead of by experiment.

I will not burden you with the involved mathematics and formulae used by these authorities. Those who wish to are free to dig up the information in the aforementioned textbook. Suffice to say here, that the experiments of these outstanding scientists bear out my earlier statements: An object moving through air at the velocity of sound meets with terrific air resistance, developing a friction heat that would make such speeds impossible.

The tremendous increase in the resistance coefficient at or near the speed of sound would stand in our way, whether that speed was 408 (the minimum speed of sound) or 749 (the maximum speed of sound) M.P.H.

The rushing of cold air over the surfaces would be of little avail, as suggested by one critic, for if all of the air stream does not make contact with the surface it cannot be expected to carry away much heat, and as soon as it does make contact the air stream develops more frictional heat.

At first glance the cooling effect of the air-stream seems plausible, but a little reflection will show that the only part of the air capable of carrying heat away is that portion of the stream that is already making frictional contact and is therefore developing heat.

I cannot see just how we can hope to reach or pass the velocity of sound without making very radical changes in the construction of the ship or in the type of the power plant, and I stand pat on the subject.

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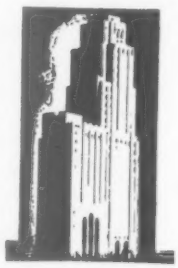

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of "POPULAR AVIATION combined with AERONAUTICS," published monthly at Chicago, Illinois, for October, 1930.

State of Illinois,
County of Cook
ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared B. Geo. Davis, who, having been duly sworn according to law, deposes and says that he is the Editor of "POPULAR AVIATION combined with AERONAUTICS," and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher, Aeronautical Publications, Inc., 608 South Dearborn St.
Editor, B. Geo. Davis, 608 South Dearborn St.
Managing Editor, B. Geo. Davis, 608 South Dearborn St.
Business Manager, R. K. New, 608 South Dearborn St.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) AERONAUTICAL PUBLICATIONS, INC., 608 South Dearborn Street; W. B. ZIFF, 608 South Dearborn Street; DAVID ZIFF, 608 South Dearborn Street; B. GEO. DAVIS, 608 South Dearborn Street.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: NONE.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect in the said stock, bonds, or other securities than as so stated by him.

B. GEO. DAVIS,
Editor.

Sworn to and subscribed before me this 26th day of September 1930.

(SEAL) ARTHUR T. PULLEN,
(My commission expires January 25th, 1932.)

If you're "On the Outside Looking in"

You need this Free Book

ARE you standing on the sidelines, wishing you were in Aviation . . . envying those who are already making Aviation history while holding down good jobs with fine futures? If so, remember this: — *Wishing won't get you into Aviation — but practical training will!* Walter Hinton's free book, "Wings of Opportunity," tells you a quick, sure, inexpensive way to get the necessary practical training—in your spare time, at home.

Hinton's personalized training and his free Employment Service are putting serious-minded, red-blooded men like you in good flying and ground jobs right along, at salaries of from $40 to $80 a week. Martin Co., Curtiss-Wright, Curtis Flying Service, Alexander Aircraft, T. A. T., Fokker and scores of other *leaders* are employing Aviation Institute graduates. In one day alone, we had calls for more than forty men!

Many other industries have reached their saturation points—and can offer only small-pay jobs with no future. But Aviation is *just beginning to grow!* In Aviation your future can be just as *big* as *you* want to make it. So why sit back? Why drift into something else, when a little foresight and judgment can put you right into the thick and pick of Aviation's opportunities and into a ground or flying job paying from $40.00 to $200.00 per week? Don't say it can't be done. We know it *can!* We're helping other fellows just like you to do it all the time.

Get the Facts—Write For This FREE Book Today

If you're 16 or over—and serious about wanting to get into Aviation, get a free copy of Walter Hinton's book. It tells how he can give you the vital facts, the necessary knowledge of plane-construction, engine-design, rigging, repairing, serviceing, airport management, navigating, theory of flight, etc. If you want to learn to fly, his course can save you many times its cost in cash. It's interesting and easy to understand from the start and packed with facts that mean success for you—no matter what branch of Aviation you choose to enter. Mail the coupon today—right NOW.

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"When I finished your course I became connected with T. A. T. and am happy to state that promotion has come very rapidly. I have no hesitancy in saying that you are responsible for the beginning of the success I have thus far attained. I shall always be grateful to you for your interest and cooperation." C. E. McCollum, District Traffic Agent, T. A. T.—Maddux Air Lines.

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"After completing your course was engaged as Aeronautical Draftsman by a leading concern. I thoroughly recommend your training. It is complete in every detail!" Ira W. Bergen, Brooklyn, N. Y.

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Robt. N. Dobbins, a Hinton Graduate writes: "I cannot thank you enough for the assistance you gave me in getting my present position. Last week they promoted me to Chief Instructor at a salary increase of $15 a week. We have about 170 students and classes in all branches of ground work."

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Scaled direct from drawings furnished by the manufacturers

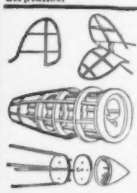
Aviation's Fastest Commercial Plane

Ideal Christmas Gift for your model building friends

Why Model Builders Prefer Champion (FLYING MODEL AIRPLANES)

Construction Sets

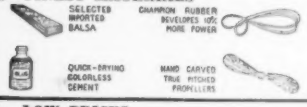
1. REALISTIC DESIGNS
"Good scale copy of the real plane," writes Fred Lovelace, Michigan. Bracing like real airplanes.



2. CLEAR DIRECTIONS
Hundreds of dollars invested in detailed perspective drawings. Every part, detail and operation shown in correct 1-2-3 order. Also complete word descriptions.

3. EXACT ENGINEERING
Designs and materials tested scientifically by M. I. T. engineer in charge laboratory equipped with precision instruments.

4. FINEST MATERIALS


SELECTED IMPORTED BALSA
CHAMPION RUBBER DEVELOPES 10% MORE POWER
QUICK-DRYING COLORLESS CEMENT
HAND CARVED TRUE PITCHED PROPELLERS

5. LOW PRICES
"I bought 7 or 8 models from various companies but I have yet to find such a bargain as your kit." "My $2 model flies better than one I got elsewhere for $9.50." "Materials best I have yet obtained."—From model builder letters.

6. INSTRUCTIVE—NOT TOYS

Teach how an airplane flies. Fun that is profitable. Learn aviation quickly at low cost.

7. THEY FLY!
Note what model builders are saying on the next page. Volunteer statements that Champion models fly unusually well.

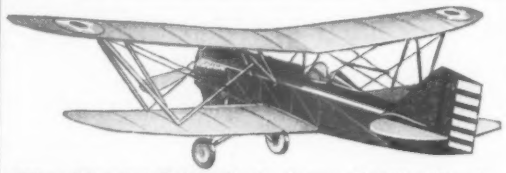
Again Champion steps out with a new construction kit that sets new standards of value for model builders. Without doubt the Lockheed Sirius is the most faithful reproduction of the full-sized plane it is possible to make and still have it fly. Every important detail has been reproduced, such as streamlined pants, gold and orange striping, N. A. C. A. cowling, even the Lockheed trademark and Lindy's famous license number, "NR-211," an exclusive feature of Champion kits. Nowhere else can you secure such a complete kit of aviation's fastest commercial plane for $2. This Lockheed Sirius is the most popular model for Christmas and you will be the envy of every model builder who sees it. Get one NOW!

Two-foot model with formed balsa prop, balsa pants shaped, celluloid wheels, windshields, stamped ribs and bulkheads, orange and gold striping, all insignia, black and orange-red tissue covering, Champion's new rubber motor developing 10 per cent more power, colorless cement, wire parts formed, ABC directions, all complete in stout mailing tube, specially wrapped in Christmas paper for holiday giving. Others ask $3 to $5 for kits not near as complete as this.

This Holiday special comes to you prepaid, Canada and west of Denver, $2.20. U. S. postpaid..... **$2**

Deluxe Kit - $3

Same as above but with celluloid N.A.C.A. cowling and celluloid pants in place of balsa cowling and pants. Packed in display box, wrapped for gift-giving. Postpaid Canada and west of Denver, $3.20. U. S. Postpaid $3.



Wins District Prize--U. S. Army Curtiss Hawk Flies 46 Seconds

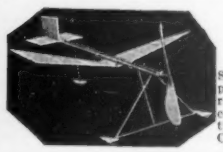
Detroit, Mich., builder wins District Prize with this flying Curtiss Hawk kit. Another reports 46 seconds duration. Realistic reproduction of Uncle Sam's fast stepping pursuit ship. Celluloid wheels, imitation exhausts, synchronized machine guns, staggered adjustable wings. Army insignia in colors, detailed full size blueprints, complete. Hand-carved, 10-in. prop., included in all kits. To be covered with yellow and olive drab tissue. Canada postpaid $3.30; U. S. postpaid..... **$3.00**

DELUXE AEROCRAFT SET

To be covered with imported silk, genuine Hawk olive drab and yellow dopes thinned down for model use. Canada and west of Denver postpaid $5.50. U. S. postpaid..... **$5.00**

$5 MONTHLY PRIZE for BEST LETTER

Beginning with December, 1930, and continuing indefinitely, we will award a $5 merchandise certificate monthly for the best letter received during each month that contains 1. Some definite model building kink, such as a better way to hold the work, a rubber lubricant formula, model design formula, use of some new, easily obtainable material in a new way, etc. This kink or idea should be something we can pass on to the model building fraternity to help them in their work. 2. What model building is doing for you or suggestions as to how we can improve our kits. For every letter containing a useable kink, we will award $1.00 merchandise certificate. So get busy, model builders, and send in your ideas and suggestions. You do not need to buy any Champion material or kits. Just address your letter to Model Kink Editor, in care of Champion Model Aircraft Supply.



HYDROPLANE

Scientific type model equipped with light pontoons. Big sport flying it from creek, river, lake or tank. Very light, contest designs give good duration. Complete construction kit. Canada $1.20. U. S. postpaid..... **$1**

WIN SILVER TROPHY AND $100 IN GOLD

Order a kit today. Complete your model and return the official entry blank enclosed with each kit. Upon qualifying your model, you are licensed PILOT and awarded Silver Wings to Wear. From pilot you advance to Flight Commander, Squadron Commander, and the winner of the Grand Gold Prize of $100.00 and the 18 inch Silver Aviation Trophy will be known as Champion's Ace for 1931. Talk about fun! Talk about thrills! There's nothing in model aviation equal to this big $1,000 Contest. 165 Awards. Honor Certificates to all qualifying entries. Complete rules and regulations with each kit. The sooner you start the better your opportunity to win! Mail your order NOW! Your kit will be rushed to you by return mail.

All-Silver Lustre Finish Spirit of St. Louis

Here's a 1½ foot flying cabin model of Lindbergh's historical New York-Paris Ryan monoplane. Finished in brilliant silver lustre. Nothing like it on market. Dozens of builders have qualified for merit certificates. Exceptional flight of 90 seconds reported by New York builder. Tough mitschfibre wing 18-inch span. Wt. 1½ oz. Simple ABC assembling outfit with numbered parts. No tools needed. 6-inch fibre prop, readicut wood struts, Clark "Y" wing ribs, 1½-in. disc wood wheels, detail drawing pictures, full directions, all parts in mailing tube; postpaid U. S. $1; Canada postpaid $1.20.

$1

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$1000 IN PRIZES — 165 AWARDS — HONOR CERTIFICATES

Hey Fellows! See what I built! Dad gave me a Champion Kit for Xmas.

$2

$1000 IN PRIZES - 165 AWARDS - HONOR CERTIFICATES

FLY Admiral BYRD'S "STARS and STRIPES" FAMOUS FOLDING WING FAIRCHILD 71

South Pole Model Ski-Equipped to Rise Off Snow

Picture the envy of the gang when you bring out this eye-arresting "Stars and Stripes" and send it flying over snow banks and drifts. Ski equipped to rise off snow, just like Admiral Byrd did in his Fairchild at the South Pole. When flying conditions change, put on pontoons or wheels. Finished in black and orange, celluphane windows, workable doors, celluloid Wright Whirlwind motor, and the wings fold back for easy storage. Easy to build. Easy to fly. Every operation visualized for you, all dimensions given, so that building a Champion model is loads of fun.

"Consistently flies 300-400 feet," says Canadian builder. "Flies like a million dollars," writes California maker. From all over the United States and Canada come similar voluntary comments from enthusiastic builders that the Fairchild 71 not only looks better, flies better—but the construction set is the BEST MODEL AIRPLANE VALUE on the market. Not just one model, but a seaplane, landplane, snowplane, 3 MODELS IN ONE. The only Byrd "Stars and Stripes" offered to model makers, so get your order in early—before the Christmas rush begins.

Re-designed to make it simpler and easier to build than ever. Prop carving will not bother you, for there is a formed balsa prop as well as a block for contest flights. Span 24 in. Chord 3⅝ in. Length 17½. Wt. ¾ oz. Selected balsa framing readicut, cement, dope, wire fittings formed, stamped wing ribs, black and orange tissue, all Byrd insignia, celluloid wheels, material for balsa motor dummy; everything complete, wrapped in stout mailing tube, specially wrapped for holiday gift giving. A $5 value sold direct to you, Canada and west of Denver, $2.20. U. S. postpaid..... **$2**

3 Models In 1

WINGS FOLD BACK like those on REAL FAIRCHILD

Deluxe Kit - $3

Same kit but with celluloid Wright Whirlwind engine and spinner. Packed in large display box and wrapped for gift giving. Canada and west of Denver $3.20. U. S. postpaid $3.00.

Read What Model Builders are Saying About These New

Champion Kits

"Flies as smoothly and steadily as the real plane. I think any beginner can build a satisfactory model from your kits," says Howard Doolittle, Connecticut.

Bruce Glassford, Canadian model builder, with his Fairchild 71. "I get constant flights of 300 to 400 ft. with ease. Model has perfect performance and long duration. My Fairchild is the best model airplane I have ever had during my career as a model builder."

Charles Bott, another Canadian builder, with his Champion model. "It will take off water; besides, land on water. Flies at about 15 ft. high and makes an excellent landing."

Wm. H. Schmitt, Chicago, Ill., age 15, flies his Champion model 17 minutes 33 seconds, winning first prize in Class B models second contest period. Flight witnessed and sworn to before notary.

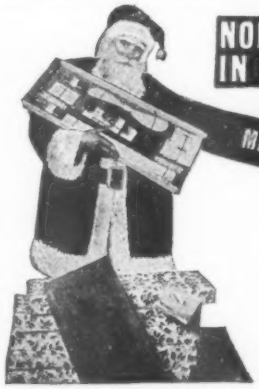
FLIES 63 SECONDS

"Everything arrived safe, Boy! They sure are good airplanes. Mother said it wasn't worth anything if its only two dollars. But now she's said its better than the one I bought for $4.98. It flew for 50 sec. r. o. g. Hand launched 1 min. 3 sec. before it hit wire and pulled the wing off."

Yours, V. Szeligo, age 15.

FREE! ALL KITS WRAPPED FOR GIFT GIVING

All orders received during December are wrapped in brilliant red holly paper for gift giving. Deluxe display sets sealed with special airplane seals and neatly tied with a gift card. Give Champion model airplane construction sets this Christmas. When requested we write your name on gift card and ship direct to one you wish to remember, saving you the bother of re-mailing.



NONE SOLD IN STORES

Because these construction sets have just been completed, you will not find Champion kits in stores. Order direct from this announcement. Send in the coupon as soon as possible, so as to avoid congested mails at the holiday season. We have made ample preparations to handle all orders promptly the day they are received. But if you wait until the last minute there is just the possibility that unforseen delay might occur. Send in your order NOW and rest assured you will have your kits in plenty of time for Christmas.

MAIL THIS COUPON NOW!

DEALERS: Champion will offer in 1931 a totally different proposition for handling model airplane sets and supplies more profitably. Send in your name and address now and be on our list to receive the opening announcement.

TEAR OUT—MAIL RIGHT AWAY

BE THE FIRST TO FLY THESE NEW MODELS

New postal regulations make it necessary to require one-fourth down on all C.O.D. orders. Include 5 cents extra to insure delivery of your order.

CHAMPION MODEL AIRCRAFT SUPPLY, 1524 Atlas Building, Columbus Ohio

Gentlemen: I enclose $..... for which send me, right away, in special Christmas gift wrapping, model airplane construction kits I have checked below:

☐ Byrd Fairchild	$2.00
☐ Byrd Fairchild Deluxe	$3.00
☐ Spirit of St. Louis	$1.00
☐ U. S. Army Hawk	$3.00
☐ U. S. Army Hawk Deluxe	$5.00
☐ Lindbergh Lockheed	$2.00
☐ Lindbergh Lockheed Deluxe	$3.00
☐ Hydroplane	$1.00
Extra for postage and insurance	

Name .....

Address .....

City and State.....

Please Print Plainly

HONOR CERTIFICATES — $1000 IN P

The Correct Way to Pack a 'Chute

(*Continued from page* 19)

COL. ABBOT was telling the author of a little incident that will bring out the importance of this inspection of the rip cord.

He was making a jump over San Francisco Bay in January of this year. When he had cleared the ship he pulled his cord, or rather, he pulled and the ring came away and the cord stayed put. This proved to be his most embarrassing moment.

He fell two thousand feet before he could get the cover off his release pins and pull the cord from the "business end."

A rookie might have lost his head in a case like this, and that's the reason we say *be sure the ring is firmly attached.*

After threading the cord through the metal tubing, pull the ring well into the ring pocket on the harness.

Now put the forked ends of the rip cord through the holes in the release pins (Illustration No. 8), pulling out the pieces of wire as you put the ends in.

Some chute packers tie these rip cord ends in the pins with thread to be sure the chute does not open accidentally. There are arguments for and against this practice, so you can use your own judgment.

If you have a certain brand of chute you will have one more operation to complete. This particular chute has rubber cords that attach to the end of the case, helping to pull the case apart when the rip cord is pulled. This is a "hook and eye" proposition and in case you don't get the idea, get some old married man who lived in the days of corsets to help you out.

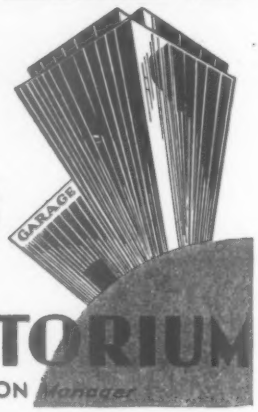
And now if you fasten the cover over the pins you are through.

Packing a chute is not a hard job, and once you do it you will never forget how to "roll your own."

Value When YOU Go To CLEVELAND

NOW $2 $2.50 $3

EVERY ROOM WITH BATH



300 Clean Modern Rooms

HOTEL AUDITORIUM

EAST SIXTH at ST. CLAIR AVE. W. H. BYRON Manager

Save Money! | *DALLAS AVIATION SCHOOL—DALLAS, TEXAS* | Save Time!

Flying Students — Come South!

Win Your Wings in Sunny Texas — Spend the Winter Months in Mild Summer Skies — At the School Where It's ALWAYS Flying Weather . . .

Dallas Aviation School's Advantages

Largest in the South.

Nationally recognized for quality of training and ability of graduates.

Practically ALL of our students pass their government tests.

We have one of the best training squadrons in America —15 ships including 5 new "Fleets."

Efficient training system and no weather delays enable you to finish quicker.

Low living expenses, with board and room on the field, save you money.

Come to Dallas and you will finish your flying training MONTHS earlier than those who train "up North." Everything at this school is just the way you would have it. There is no finer city, no better flying school in America.

WHY PAY MORE?

$2500 TRANSPORT COURSE 200 Air Hours

$ 795 COMMERCIAL COURSE 50 Air Hours

$ 385 PRIVATE PILOT'S COURSE 20 Air Hours

We Pay Your Railroad Fare To Dallas no matter how you come, if you take the Transport or Commercial Course. One-half your fare if you take the Private Pilot's Course.

Our Complete Ground School Course Is Included in Each of These Big Courses.

DALLAS AVIATION SCHOOL

Love Field Dept. P Dallas, Texas

Write or Wire Today for FREE Catalog and Full Details.

Learn AVIATION WHERE LINDBERGH STARTED!

Get "Hep" to Yourself!

IF YOU'RE not earning sufficient money—not advancing fast enough—not sure of a good future in your present work—then get "hep" to yourself! Get into Aviation! For air transportation companies pay Pilots an average of $550 per month. Airplane and motor mechanics make Good Pay. And there's quick advancement—with unlimited opportunity—in Aviation!

But to insure success, you'll need the right kind of training. Get thorough, intensive training at the Lincoln School. Think of it! Lindbergh trained in Lincoln. You train at the same place!

LINCOLN AIRPLANE & FLYING SCHOOL

Complete facilities, competent instructors and special training methods enable us to give the very highest type of Pilot and Mechanical Training. **This school is Approved by the U. S. Department of Commerce as a Transport, Limited Commercial and Private, both Ground and Flying School.** Here you have the advantage of more than $250,000 worth of buildings and equipment. A modern $100,000 airport. A large fleet of various types of modern planes. Government-licensed instructors. And as our Mechanical School is connected with a large-production aircraft factory, you learn practical factory methods of repairing and building planes.

Lincoln Courses include training for all government Pilots' and Mechanics' Licenses. **Tuition is unusually reasonable.** Mail Coupon today for complete information!

Mail Coupon for FREE Catalog!

A photo taken at our airport. Many of the Lincoln students shown here are now holding Good Pay positions.

Here's a Tip! If you wish to be a Transport Pilot but can't afford this course, take our Master Airplane and Motor Mechanics' Course. Then, as a Master Airplane and Motor Mechanic at Good Pay, you can earn your way through a Pilot's Course. Many Lincoln graduates do this.

Part Time Employment—Right now we are offering part time jobs to a limited number of students, which help pay living expenses while in training.

We assist our graduates in every possible way in locating positions after graduation.

MAIL THIS COUPON!

LINCOLN AIRPLANE & FLYING SCHOOL
234 Aircraft Bldg., Lincoln, Nebr.

Dear Sirs: Please send me the Lincoln School Catalog containing full information, reasonable tuition rates, and part time employment offer.

Name.....*Age*.....

Address.....

City.....*State*.....

The Ambassador

is the headquarters for National and International Aviation Notables

Representative of everything that the finest hostelry can be in location, charm, excellence of menus and service. Near the air line terminals, theatre and shopping district.

NEW YORK
PARK AVENUE AT 51st STREET

ATLANTIC CITY
PALM BEACH
LOS ANGELES

Is the Airship Safe?

(*Continued from page 34*)

of the framework. Such a gust never is encountered in actual flying.

The fire risk in a helium-filled Zeppelin airship is no greater than in a modern automobile. Past experience has shown that the burning of aircraft usually results from a collision in which fuel tanks are broken open. Such a collision is but remotely possible with a huge air liner. But precautions are being taken in the ZRS-4 to avoid fire.

Engine rooms are fireproof, and have elaborate fire-fighting equipment. Electrical connections are gas-tight to prevent ignition of fuel vapors that might be present locally. Because of the triple-layer hull construction, all parts of the ship are ventilated, preventing accumulation of gas fumes in pockets.

Lightning is a source of danger to the airplane under certain conditions, but the huge size of a Zeppelin-type airship makes electrical discharges negligible in effect. Past experience with Zeppelins has shown that a direct hit of a lightning bolt results only in local damage that is never great.

The huge metal hull, all parts firmly bonded together, acts as a gigantic Faraday cage that effectively dissipates the electrical charge without damage to itself.

The ship is constructed so that any part of it can be reached by members of the crew during flight. This is a factor of safety, for damage to any part can be repaired at once. The experience of the Graf Zeppelin in losing a control surface covering demonstrated the value of such construction.

On the whole, experience with the airship during a third of a century has shown that it is a remarkably safe vehicle when scientifically designed and flown. Especially on long distance trips is its superiority to other vehicles of travel shown, and we may expect the dirigible soon to become the most dependable form of speedy transportation to remote corners of the earth.

Learn at home AIRCRAFT Drafting

Aviation Needs Men Who Know Airplane and Engine Design

Drafting prepares you for big factory jobs. Study in your spare time. Pay as you learn. Our expert engineers teach you designing and manufacture of airplanes, engines, accessories; aerodynamics, all one course. No entrance examinations required. Drafting outfit supplied. Employment service.

Write for Our Free Catalog.

CALIFORNIA TECHNICAL COLLEGE
San Diego California

THE *SCHOOL* FOR *YOU*

is the one giving the most positive advantages

We offer you an Experienced School with Unsurpassed Record, Complete Ground Training, Field with hard surfaced runways and lighted for night flying, close proximity to Big Government Fields, Plenty of Modern Equipment of various types, Winter Flying and Lowest Prices. Our Students Pass their Tests.

10 hours flying	**$150**	**50 hours flying**	**$725**
20 hours flying	**320**	**60 hours flying limited commercial course**	**840**
25 hours flying private pilot course	**375**	**210 hours flying transport course**	**2500**
Mechanic's Course	**100**	**Master Mechanic's Course**	**200**

Winter is Here

Register now in a School that can give you continuous training, uninterrupted by weather delays and so save you time and money. Uncle Sam chose San Antonio for the WORLD'S GREATEST AERONAUTICAL CENTER because the weather conditions here are nearest ideal.

SOUTHERN AIRWAYS SCHOOLS

R. R. fare refunded to San Antonio from all U. S. points on 50 hr. course or more; ½ R. R. fare on 25 hr. course.

12 YEARS UNBROKEN RECORD FOR SAFETY

The Oldest School in the South

SOUTHERN AIRWAYS SCHOOLS
Aztec Bldg., San Antonio, Tex.

Please send catalog. I am interested in your
☐Mechanical Course ☐Private Pilot Course
☐Lim. Com. Course ☐Transport Course

Name.....

Street.....

City.....*State*.....

ALL BALSA—AMERICA'S MOST EASILY CONSTRUCTED MODELS!

A new, all-balsa construction makes these Midland models superior to anything you have ever seen. Lighter—about two-thirds the weight of an ordinary model of the same size. Stronger—practically crash-proof. Better-looking and more realistic because of the smooth sheet-balsa surfaces that replace wrinkled and sagging tissue. And easier to build, because so much simpler!

The ordinary model would be fairly satisfactory if it could be built with less skill, but many model builders find that they have wasted their time and money on a kit that only an expert can put together. It is probable that not one model in ten has ever been constructed well enough to fly. Most sets are far too complicated for the average purchaser.

For this reason simplicity has been made the key-note of Midland design. Sheet balsa 1-32 of an inch thick is used for the wings and sides of the fuselage. Balsa—almost as light as the doped paper covering of the ordinary model, and far stronger than the delicate framework which it replaces! Paper is used only in the tail and to cover the top and bottom of the fuselage.

A ready-made aluminum propeller is more efficient than anything you could make by tedious hand work. Celluloid wheels, light and good-looking. Spruce and bamboo struts. A shock-absorbing landing gear. Colorless, quick-drying cement—the fastest-drying known. More elastic rubber motors. Landing wheels well forward to protect the propeller. Wings at a high angle of incidence for fast climb and minimum center of pressure travel. Tips "washed out" to reduce losses. Scores of other aerodynamic refinements seldom found in models.

We do not pretend that these are exact scale models, for such models are difficult to build, unsatisfactory to fly. We do not pretend that these models will break championship records, for record-breaking models are too delicate to build, too fragile to last. All we say is that these models are pleasingly realistic, that they will fly unusually well time after time, and that they are surprisingly easy to build.

You will find these models easier to build, and, after you have built them, much more satisfactory to fly. Fewer trial adjustments; longer, steadier flights.

The MIDLAND MODEL WORKS
Box W, Chillicothe, Ohio

TAPER-WING COMBAT MONOPLANE

An Unusual Value

An exceptionally graceful model of a center-wing combat monoplane, and the best distance flyer of the Midland group. Does 200 feet consistently. Can be hand launched or will rise off ground. Very easily built, and will stand hard use. Wing span 20 inches. Weight 8-10 ounce.

Complete set, with all material and full building and flying directions, postpaid in the United States and Canada..... **$2.00**

MIDLAND BABY BULLET

Wing span 15 inches. Weight ⅜ ounce. Flight range 140 feet or more.

A simple, easily constructed r. o. g. model of a one-place low-wing sport plane. The propeller is only one-fourth as long as the wings, and much closer to true scale than in ordinary models. Propeller blades deeply curved for slow revolution and unusual duration.

Complete set, with all material and full building and flying directions, postpaid in the United States and Canada, only..... **$1.00**

Midland Army Biplane in Flight

Unretouched photograph

THINK BEFORE YOU BUY!

Not all model airplanes have given their purchasers the pleasure they expected. While some of these failures have been due to carelessness on the part of the builder, or, more frequently, to the unreasonable difficulties encounted in construction, there have been failures caused by the fact that the model was absolutely incapable of flight even if perfectly built.

While it is regrettable that not all model airplane manufacturers are entirely honest, it is fortunate that you yourself can see through the usual tricks of the few dishonest ones.

Don't be satisfied with the statement that the model will fly. If the manufacturer won't say how *far* it will fly it may be an indication that the model will fly only a few feet. And be sure that the manufacturer himself makes the flight claim. A manufacturer, knowing that his model won't fly, and knowing that it is illegal for him to make the claim directly, may get someone else to make the claim in a testimonial letter which he can reprint in his advertisement.

Be cautious about "doctored" photographs—photographs retouched to make the model look better than it is. Pictures that look more like drawings than photographs may be used. Remember, for example, no matter how glassy smooth a model may look in the picture, that if it is an ordinary paper-covered design the covering is bound to sag between ribs and longerons, and that the smooth round fuselage of a Lockheed model may look very ribby and angular in reality.

In a few cases pictures have been faked entirely. One manufacturer advertised a model of Lindbergh's Sirius with a picture of the full-size machine, and the same firm took the picture of another firm's model to advertise a biplane model. And the stolen picture was retouched to make it look better than the original!

Remember that the pictures used in Midland advertisements are from unretouched photographs. Don't be fooled by the tricks to which a few unscrupulous manufacturers may resort. Always think over an advertisement to see if it *does say* what it *seems to say*.

REALISTIC ARMY BIPLANE

This fast biplane fighter is a tremendously impressive model. Its trim fuselage and tapered, close-set wings give an impression of speed, and in the air it looks so much like a real ship that flight photographs of the model are usually mistaken for pictures of a full-sized airplane.

The wing spread is 20 inches, the weight exactly 1 ounce. The flight distance is close to 200 feet. Because of its greater wing area the Army Biplane gains a great deal of altitude. The average limit is about 50 feet, but we have photographed it when almost three times that high!

The top wing is in advance of the lower one, and at a larger angle of incidence. This results in the center of pressure both wings being shifted *forward* when the model dives, *back* when it climbs. This is the exact opposite of the usual movement, and gives the model unequaled stability. By far the best rough-weather flyer we have seen.

Harder to build than the monoplanes, but still much easier than any conventional built-up model. Complete set, with all material and full building and flying directions, postpaid in the United States and Canada. **$2.50**

ORDER NOW—USE THIS COUPON

THE MIDLAND MODEL WORKS, BOX V, CHILLICOTHE, OHIO

Gentlemen:

Enclosed find $..... for which send me your construction set for ( ) BABY BULLET ( ) COMBAT MONOPLANE ( ) ARMY BIPLANE. I understand that these sets will be sent postpaid in the United States and Canada, and that you guarantee any properly constructed model to fly as stated.

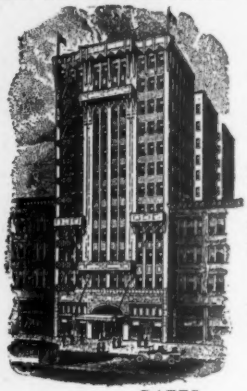
(Check or money order safer than cash. We cannot accept stamps or fill C.O.D.'s. No catalogue, except with set.)

Name.....

Street.....

City..... State.....

Los Angeles
Hotel Stowell
414-16-18 So. Spring St.
Between 4th and 5th Streets TRinity 3011



(12 Stories, Fireproof)

Los Angeles, Calif.

In the Heart of the City, near all Theatres and the Shopping District.

275 Rooms, all with Bath and running ice water.

14-story Hill Garage right across the street.

RATES

100 Rooms—for one, $1.50—for two. $2.50
50 Rooms—for one, $2.00—for two, $3.00
50 Rooms—for one, $2.50—for two, $4.00
75 Rooms—for one, $3.00—for two, $5.00

Chas. B. Hervey & J. Manning Murfee
Proprietors

The Startling Truth About War Flyers

(*Continued from page* 53)

American squadron attached to the British, is only one of thousands of cases in point. He was being run ragged by a Hun who sat on his tail and wouldn't get off. With his head turned, Knotts was watching his adversary every instant, trying to outmaneuver him or escape.

A flurry of bullets passed his face—one of them hit him on the bridge of the nose, so lightly it scarcely broke the skin. Somebody chased the Hun away—or Knotts finished him, I don't remember which—and he came home and repaired the damage with a piece of courtplaster.

Figure it out for yourself. The bullet was traveling some 2,500 feet a second. Knotts was moving at the rate of 100 miles an hour, 147 feet a second. If the bullet had hit three inches farther back—aloha. Figuring the speed of the plane alone, the old man with the scythe missed him by one six-hundredth of a second.

A lot of fliers could think fast and act in split seconds, but none of them kidded himself he could out-smart a second split as finely as that.

These narrow squeaks happened every day—many times a day. A few of them were convincing proof that you had no more control over your destiny than you had over what Ludendorff ate for breakfast. There were so many examples—

Major Bill Barker emerged from one of the wildest aerial battles of the war as full of holes as a Swiss cheese, but alive. Richthofen was killed by a single bullet, a chance shot fired wildly and at long range that found his brain. They couldn't kill the great Major McCudden in the air, but he killed himself in an accident. Bill Pace, who led two daring daylight bomb raids to Cologne and who claimed he had been attacked at one time or another by every Fokker ever built, lost his life in a silly automobile accident. Mick Mannock, the idol of the British service, was invincible in the air, but they got him with a lucky shot from the ground.

All in all, while fatalism may not have been an entirely comforting doctrine, it was an eminently practical one. Those who believed their time would come when it came were light worriers.

* * * *

With all its misery and violence and destruction, there was a gripping fascination to aerial combat that held these youths in a grasp of steel.

The heart-hurts have healed now. The strain and work and worry are a dim memory—very dim. In the years since it happened the boys have forgotten the bad—they remember only the good.

So you can ask any one of them—they'll all make the same answer—

"It was a great war while it lasted."

BE SURE TO SUBSCRIBE TO POPULAR AVIATION

LEARN AT HOME **HOW TO FLY COMPASS COURSES** FORETELL THE WEATHER

Don't be satisfied with being "just another pilot," but make yourself a better pilot—one who can command a better salary.

The American Air Navigation Correspondence School offers a practical and economical course in Air Navigation and Meteorology. Study at home the simple rules and problems of this subject; familiarize yourself with cloud formations; learn to make adjustments for drift; to read maps, etc. Course contains maps, charts, combination dividers, compass protractor, parallel rules, illustrations, and other necessary equipment.

Your inquiry will bring full particulars.

AMERICAN AIR NAVIGATION CORRESPONDENCE SCHOOL
404-405 COMMERCIAL TRUST BLDG. BUFFALO, N. Y.

Please send me descriptive literature of your course

Name..... City.....

Address..... State.....

Internationally Famous . . .

HOTEL ALEXANDRIA
LOS ANGELES

DISTINCTION » ECONOMY » COMFORT

Home of THE AVIATION CLUB.
Headquarters—N. A. A. OF SOUTHERN CALIFORNIA

▼ ▼ ▼

"It costs no more to stop at the distinctive world-famous Alexandria than at the average Hotel"

75 Rooms, running water, private toilet, Single, $2 to $3. Double, $ 3 to $ 5.
380 Rooms, each with private bath . . . . Single, $3 to $4. Double, $ 4 to $ 7.
245 Rooms, each with private bath . . . . Single, $5 to $8. Double, $ 7 to $10.
A number of large and beautiful 2, 3, 4, and 5 room suites . . . . . $10 to $25.

ALEXANDRIA HOTEL COMPANY
E. C. EPPLEY, President » CHARLES B. HAMILTON, Vice-President and Managing Director

◆The Alexandria Hotel is an affiliated unit of The Eppley Hotel Co.'s 20 Hotels in the Middle West, Louisville, Ky., and Pittsburgh, Pa., and the Hamilton Chain of Hotels in California and Arizona.

FOR THOUSANDS OF MEN
Tobacco Habit Banished
Let Us Help You

Stop craving tobacco in any form. Tobacco Redeemer in most cases relieves all craving for it in a few days' time. Don't try to quit the tobacco habit unaided. It's often a losing fight against heavy odds, and may mean a distressing shock to the nervous system. Let Tobacco Redeemer help the habit to quit *you*. It is pleasant to use, acts quickly, and is thoroughly reliable.

Not a Substitute

Tobacco Redeemer contains no habit-forming drugs of any kind. It is in no sense a substitute for tobacco. After finishing the treatment, there should be no desire to use tobacco again or to continue the use of the remedy. In case the treatment is not perfectly satisfactory, we will gladly refund any money paid. It makes not a particle of difference how long tobacco has been used, or in what form—whether it is cigars, cigarettes, pipe, plug, fine cut or snuff. In most cases Tobacco Redeemer removes all craving for tobacco in any form in a very few days. And remember, it is offered with a positive money-back guarantee. Write today for our free booklet showing the injurious effect of tobacco upon the human system and convincing evidence that TOBACCO REDEEMER has relieved the craving for tobacco in thousands of cases.

NEWELL PHARMACAL COMPANY
Dept. 975 Clayton Station St. Louis, Mo.

Major Rockwell's Graduates Make Good

"FEW INSTRUCTORS TAKE THE INTEREST YOU HAVE SHOWN"

Dear Major:
Few instructors take the interest in their students you have shown in me.
I will be glad to recommend your method of training to anyone who intends to take up aviation and know that if they follow your instructions as laid out they will be successful.
Assuring you of my sincere appreciation for all the things you have done for me. I am
Thos. H. Hatton,
Scranton, Penn.

"YOUR' INSTRUCTIONS AND SERVICE BEST OBTAINABLE"

Dear Major:
I deem it an honor to be one of your students and have always found your instructions and service the best obtainable, because you give your students the knowledge needed by them in the simplest, shortest method possible.
I will boost you and your individual method of training to all who are interested in the study of aviation.
Edward Rutledge,
Louisville, Ky.

PROUD TO BE A "ROCKWELL" MAN

Dear Major:
I want, at this time, to express my appreciation for the courteous attention I have always received from you.
I feel sure there are very few instructors who work so closely with their students, and I am sure that your individual method of training will continue to grow and prosper for many years to come. I am always proud that I am a Rockwell trained man and consider you to be one of the most competent instructors today.
Douglas W. Shafor,
Hamilton, O.

Major Rockwell
World War Flyer
Who Will Train You
AT HOME

Major Rockwell is a famous world war flyer, decorated with the Legion of Honor and the War Cross. He is now devoting himself to teaching Aviation, and he will train you for a position in this great new industry as only a veteran World War flyer can train you.

"I Will Train You at Home LEARN TO EARN $300 to $400 a Month"

I offer you this easy, quick way to get into Aviation. There is a need for trained men, and this is your opportunity to enter this uncrowded, fascinating field with a bright future.

In a Few Short Months

Just devote about an hour a day to my Home Study Course, **and in a few short months you can master the principles of Ground Training, which are necessary before you take your place in any branch of Aviation.** In a few short months I will give you practical aviation training and prepare you for one of the better pay jobs open to men thoroughly trained in Aviation.

No Advance Education Necessary or Experience Needed

You don't need to have a high school or college education to master my course. You do not need to know anything about airplanes, motors or mechanics. My home course is thorough and complete. Everything is so clearly explained, with easy-to-understand text and pictures, that in a few short months you will be able to grasp every fundamental principle of Aviation ground work and you will be well on the road to qualify for an important aviation job, that will later lead into a job paying $300 to $400 a month. My Home Study Course will give you all the knowledge necessary to pass the government's written examinations for mechanics' or pilots' licenses.

Airplane FREE

I'm going to give an airplane absolutely free. Rush coupon for full particulars on how you may get this airplane delivered to your home—FREE.

You Learn Principles of Aviation at Home Then Choose Any One of 40 Ground Jobs. My Home Study Course All You Need

When you have completed the ground training I will arrange for you to take your flying instruction at any licensed airport near your home at special reduced rates. Or, if you want, you can come here to Dayton and get training at a fine, well equipped airport. No matter where you learn to fly you can qualify for a pilot's license and a high pay flying job in passenger lines, mail service, and other important branches of flying.

Employment Service
After you graduate I assist you in getting a job without any cost to you. Right now the demand for trained men is greater than the supply. A place is ready for you!

Only TRAINED Men Can Qualify in Aviation

The big money in Aviation does not go to the novice or apprentice. Only TRAINED men can command the high salaries. Employers are glad to pay big money for men who know Aviation—builders, mechanics, service and maintenance men, and flyers. Let me prepare you for one of the many high salaried Aviation jobs open to the trained man. I will prepare you to take your place in the most fascinating, fastest growing industry in the world. Rush this coupon to me for a copy of my famous free book.

MONEY BACK AGREEMENT

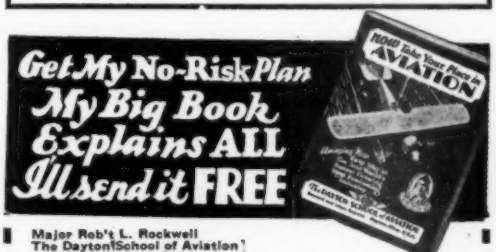
I am so sure that you can learn Aviation with my help and step into a good Aviation job that if you are not satisfied when you have finished my course, I agree to return every penny of your tuition.

Now Manager of Big Company

Dear Major:
The main thing about your individual method of instruction was that you not only gave me a thorough knowledge of Aviation, but you also showed me how to capitalize on what I learned. I am now General Manager for International Air Surveys and making three times what I ever earned before. I will always be a booster for your method of training.
Floyd Prothero.

Solo in 7 Hours

Dear Major:
Your excellent advice prevented me from taking up Aviation the wrong way when I wanted to learn flying first. After I had completed your ground course, which thoroughly prepared me in the principle of flight, I was able to solo in 7 hours. I always will be glad to tell anyone that I am a Rockwell trained man.
Wm. C. Rickels.



MAJOR ROB'T L. ROCKWELL
The DAYTON SCHOOL of AVIATION
Desk Z-54 **DAYTON, OHIO**

Major Rob't L. Rockwell
The Dayton School of Aviation
Desk Z-54 Dayton, Ohio
Dear Major:—Please send me FREE and without obligation a copy of your famous book on Aviation; also your tuition and Free Airplane offer.

Name.....

Address.....

Town.....State.....Age....

•KEEPING FAITH WITH THE YOUTH OF AMERICA•

THE Spartan School of Aeronautics was founded on two theories. First, that aviation will be one of the world's greatest industries and, second, that the youth of America would awaken to the fact that success is entirely dependent upon thorough, efficient training . . . training that provides practical as well as theoretical experience. ¶ At the Spartan School students are familiarized with conditions they will meet as commercial pilots through extensive cross-country flights. The Dawn Patrol . . . a semi-military honor organization of Spartan students . . . has provided our graduates with more than 3,000 miles of cross-country flying from the romantic Rio Grande valley to the glistening shores of Lake Michigan. And while northern schools are snow-bound, members of the Dawn Patrol will continue to sweep through the sunny skies of the Southwest, eliminating expensive idleness during the winter months. ¶ In order to allow more young men to enter aeronautics, the Spartan School has made it less of a financial burden by offering liberal extended tuition payment plans for all courses. Whether you want to enter aviation as a mechanic, private, limited commercial or transport pilot, welder or business executive, there is a Spartan course to fit your particular tastes and a payment plan available to fit your pocketbook. ¶ And, finally, back of Spartan is the security of an organization possessing both the purpose and resources to remain America's finest aviation school. » »

UNA INVITACIÓN A LOS ALUMNOS DE HABLA ESPAÑOLA

La escuela de aviación Spartan (Spartan School of Aeronautics), autorizada por el gobierno de los Estados Unidos del Norte, y con la aprobación del Departmento de Trabajo de dichos Estados Unidos, tiene la honra de anunciar a ustedes que con esta fecha ha terminado todos los arreglos referentes a las facilidades que, para mayor conveniencia en el curso de aprendizaje y entrenamiento, se han introducido en esta escuela. Aquí, bajo el risueño clima de Oklahoma, ustedes podrán hacer sus vuelos por todo el año. Además, los necesarios para la vida se obtienen aquí a precios muy módicos. Un cuerpo de instructores de habla española-inglesa impartirá a ustedes las mayores cortesías posibles. ¶ Tendremos gran placer en enviarles uno de nuestros hermosos catálogos ilustrados, con descripción detallada de los cursos y comodidades que la Spartan School ofrece. Esta institución está subvencionada por una compañía petrolera independiente de las más fuertes de América.

SPARTAN SCHOOL of AERONAUTICS

U. S. DEPT. OF COMMERCE APPROVED
·TRANSPORT GROUND & FLYING SCHOOL

SPARTAN SCHOOL OF AERONAUTICS,
Tulsa, Oklahoma.

Gentlemen: Please send me your 32-page book describing all Spartan School courses, extended tuition payment plans and information about FREE TRANSPORTATION to Tulsa.

NAME_____

ADDRESS_____

CITY_____ STATE_____

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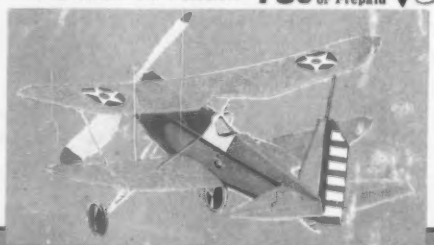

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